



THE ART OF MASSAGE

By
John Harvey Kellogg

THE ART OF MASSAGE

*A Practical Manual for the Nurse,
the Student and the Practitioner*

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PREFACE

WHEN the writer began the therapeutic employment of massage, this method was generally looked upon with more or less suspicion as being closely allied to quackery if not absolutely irregular. In those days there were many magnetic healers who cured by laying on of hands, and in New England there was a family of bone-setters who had developed a considerable local reputation by the peculiar manipulations which they practiced upon their patients, not infrequently to their decided detriment.

Fifty years ago there were in this country few if any persons who were really skilled in massage. It was only by visiting Stockholm, Sweden, and Germany and France that it was found possible to obtain a practical knowledge of the subject.

After the employment of massage by the aid of a score or more of well trained manipulators during the last fifty years, the writer's faith in the efficacy of this measure as a means of reaching definite therapeutic results is far greater than at the beginning. As the years have passed, abundant opportunities have offered for testing the various systems and methods which have been presented in this country and Europe, and the result has been the development of very clearly defined methods. The author's constant purpose has been to eliminate the unnecessary and inefficient, and to develop and perfect those methods capable of securing most definite and prompt results. Special attention has been given to massage of the abdominal region and the important accessory means of influencing the vital organs which are found in this region of the body.

The physiologic research which has been applied to the methods of massage within recent years has clearly demonstrated the effectiveness of external manipulations as a means of influencing metabolic and other processes in the deeper parts of the organism. At the present time it may be said to be clearly established that

every organ and every function of the body may be influenced by the procedures of massage. Both the volume of blood and the movement of blood in every internal viscus may be decidedly influenced in either direction by external manipulations. Specific effects of the various external applications are pointed out in the physiologic portion of this work.

In this book the writer has sought to describe as clearly as possible the various procedures of massage as practiced at the Battle Creek Sanitarium, where there has been perhaps a larger and more continuous experience with this method than at any other center in the United States. Since the publication of the first edition (1895), a system of manipulations designated by the term "Osteopathy" has become widely known throughout the country. At the beginning this method was greatly lacking in the necessary characteristics of a scientific system, and its recognition by the medical profession has been greatly hindered by the extravagant claims and unscientific methods of its early promoters. It has been interesting, however, to note the considerable progress which has been made by the practitioners of this system toward a more scientific method by the elimination of fallacious and pretentious claims and the more thorough training of its practitioners in the fundamental facts and principles of medical science. At the present time there are almost as many different kinds of Osteopaths as there are different sects in Christendom. There are many different osteopathic schools and each one has its own system. All differ very considerably among themselves, but if we may credit assurances received from a leading teacher in one of the leading osteopathic colleges of the country, there is an increasing movement away from the original empirical Osteopathy, and toward scientific medicine as understood by the more progressive of modern medical leaders. It is prophesied by this class of Osteopaths, and the prophecy may be easily believed, that the time is not very far distant when the term "Osteopathy" will disappear except as an interesting relic of pseudo-scientific medicine, and so-called Osteopathy, purged of its unscientific incumbrances, will be swallowed up by scientific medicine. There are already marked signs of such an assimilation.

From the writer's standpoint, there is little to be found in original Osteopathy which is not included in scientific massage and manual Swedish movements when thoroughly understood and efficiently applied. Credit must be given Osteopathy, however, for having emphasized this class of therapeutic measures and compelled its recognition and its advancement to a much more permanent place in therapeutics than it previously enjoyed. That it was necessary to wait for this to be accomplished by a pseudo-scientific cult like Osteopathy is no particular credit to the medical profession. The only proper attitude for the profession at the present time is to accept and utilize every principle presented which is supported by anatomic and physiologic facts, and thus encourage those who recognize the therapeutic value of manual manipulations to fit themselves by broader medical study to join the ranks of scientific medicine.

The history of medicine shows that it has constantly been enriched by therapeutic contributions from sources outside the recognized medical authorities. Hydrotherapy found its development among the peasantry of Austrian Silesia; massage came from the most primitive sources, being borrowed originally from the ignorant savages of the South Sea Islands. Electricity was for a century a magic wand in the hands of charlatans. Hypnotism, now recognized by some as a scientific method, originated with the charlatan, Mesmer. Science will recognize truth, no matter what its origin may be.

In the teaching of therapeutics, too exclusive attention has been given to the study of drugs and drug medication. Dietetics, electrotherapy, hydrotherapy and particularly massotherapy and kinesotherapy have been so greatly neglected that it is not strange that men impressed with the value of these procedures should have undertaken to create of them a specialty and a new sect in medicine.

But physiologic medicine is making marvelous progress in recent years. A more liberal and progressive spirit is growing in the medical profession, and the time is not far distant when all medical sects will disappear, and scientific medicine will stand forth as the representative of all curative methods which possess

real merit. Indeed, this is the real position of scientific medicine.

The author desires to call the attention of those who specialize in massotherapy to the importance of utilizing other forms of physiotherapy in connection with massage. Hydrotherapy is especially useful as a supplement or complement of massotherapy. Every physiologic method has its special advantages and certain characteristic disadvantages. Massage is especially valuable as a means of quickening the circulation and other forms of vital activity. This is its characteristic effect. When skilfully applied, it may sometimes serve as a means of relieving pain, but this is one of its lesser, and one may say, its natural and inconstant effects. Not infrequently pain is temporarily increased by massage, either in consequence of an increased volume of blood or because of lack of perfect adaptation of technique to the individual case. In either instance the masseur may not be at all blameworthy, for it is not possible, especially when first taking a case in charge, to adapt treatment with a nicety to the unknown conditions present. Hydrotherapy offers, in both classes of cases referred to, assistance of the greatest value as a means of combating inflammatory conditions, and especially as a means of relieving pain. It is often highly advantageous to apply hot fomentations or other heating measures in connection with massage, especially in the treatment of painful joints. The heating compress is another hydriatic measure of great value in cases. The photophore, the arc light, and the thermophore are other measures which promote and supplement the beneficial effects of massage.

Dietotherapy must also receive due share of attention. This is especially true in the management of cases of rheumatism, gout, constipation and obesity. Change of the intestinal flora by the means now well known to be efficient, and adherence to a strictly antitoxic or non-toxic diet will remove the deep lying causes of distressing symptoms which in many cases massage can offer nothing more than palliation.

In presenting this new edition of a handbook, more than twenty-five thousand copies of which are already in the hands of

the physicians and nurses of this and other English-speaking countries, the author desires to express his appreciation of the recognition which has been given his efforts to promote the good cause of physiologic medicine which has in recent years advanced so rapidly in prestige and popularity.

*Battle Creek, Mich.,
Nov. 19, 1922.*

J. H. K.

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THE ART OF MASSAGE.

ITS HISTORY.

MASSAGE, or systematic rubbing and manipulation of the tissues of the body, is probably one of the oldest of all means used for the relief of bodily infirmities. There is evidence that massage was employed by the Chinese as early as 3000 years ago. Their literature contains treatises upon the subject written some thousands of years ago. An ancient Chinese book entitled, "The Cong-Fou of the Tao-Tse," of which a French translation appeared about a century ago, was probably the foundation both of our modern massage and of the manual Swedish movements so admirably elaborated and systematized by Ling. Massage is still very extensively employed by the Chinese, and also by the Japanese, who doubtless learned the art from the Chinese.

Among the Japanese, massage is employed almost exclusively by blind men, who go about the streets soliciting patronage by shouting in a loud voice the words *Amma! amma!* (shampooing, or massage). Fig. 1 represents one of these blind masseurs crying his vocation upon the streets of Mito, Japan. Fig. 2 shows one of them administering massage to a lady patient. These engravings are photo-reproductions from photographs kindly sent to the writer by a friend in Japan. The same friend also sent the following description of his personal experience with Japanese massage, which was administered to him by a first-class manipulator, for the relief of a severe cold accompanied with fever:—

“The shampooer sat in Japanese fashion at the side of the patient, as the latter lay on a *futon* (thick comforter or quilt) on the floor, and began operations on the arm; then took the back and the back of the neck, afterward the head (top and forehead), and ended with the legs. On the arms, back, back of the neck, and legs, he used sometimes the tips of his fingers, sometimes the palms or the backs of his hands, sometimes his knuckles, sometimes his fists. The movements consisted of pinching, slapping, stroking, rubbing, knuckling, kneading, thumping, drawing in the hand, and snapping the knuckles. The rubbing in the vicinity of the ribs was slightly ticklish, and the knuckling on the back of the neck, and at the side of the ear-lar bone, a little painful. On the head he used gentle tapping, a little pounding with his knuckles, stroking with both hands, holding the head tight for a moment, grasping it with one hand and stroking with the other. The operator seemed to have a good practical knowledge of physiology and anatomy, and certainly succeeded in driving away the headache and languor, in producing a pleasant tingling throughout the body, and in restoring the normal circulation of the blood. He is to be criticised, however, for one serious fault in his operations,—that of shampooing down, instead of up. A portion of the good done is thus neutralized, one object of scientific massage being to help back toward the center the blood which is lingering in the superficial veins.”

I do not agree with my friend's criticism of the mode of manipulation employed by the Japanese masseur, who seems to have been more skilled than most of our own manipulators, since he was apparently aware of the fact that the limbs should be rubbed down, rather than up, for the relief of the condition of feverishness and irritation from which his patient was suffering.

Massage has been employed from the most ancient times by the Hindoos and Persians, who still practice it, some of their native masseurs being possessed of remarkable skill. The ancient Greeks and Romans also employed massage constantly in connection with their famous baths. Hippocrates, the renowned Greek physician, made extensive use of this mode of



Fig. 1 Blind Japanese Masseur
Soliciting Patronage

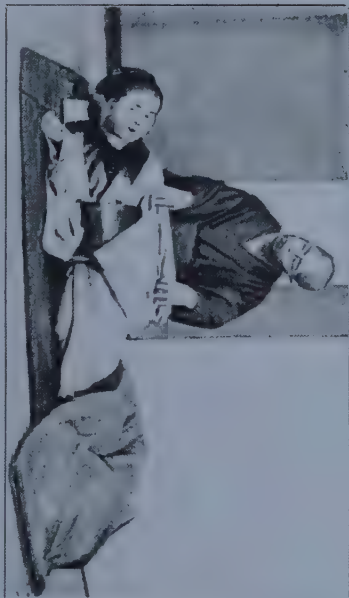


Fig. 2 Blind Japanese Masseur
Treating a Patient



Fig. 3 Polynesian Administering Romi-romi.

PLATE I. Primitive Massage

treatment, designating it *anat,ripsis*. He evidently appreciated the principles of the art very well, as he directed that friction should be applied centripetally, or in the direction of the veins. That he understood the effects of different modes of application is shown by the following quotation from his works: "Friction can relax, brace, incarnate (fleshen), attenuate; hard, braces; soft, relaxes; much, attenuates; and moderate, thickens."¹ Hippocrates learned massage, as well as gymnastics, from his teacher Herodicus, the founder of medical gymnastics. Asclepiades, another eminent Greek physician, held the practice of this art in such esteem that he abandoned the use of medicines of all sorts, relying exclusively upon massage, which he claimed effects a cure by restoring to the nutritive fluids their natural, free movement. It was this physician who made the discovery that sleep might be induced by gentle stroking.

Plutarch tells us that Julius Cæsar, a century before the Christian era, had himself pinched all over daily for neuralgia. It is well known that Julius Cæsar was subject to a severe nervous disorder (epilepsy), and it is more than probable that his prodigious labors were only rendered possible by the aid derived from massage. Pliny, the great Roman naturalist, had himself rubbed for the relief of chronic asthma. Arrian recommended massage for horses and dogs, asserting that it would strengthen the limbs, render the hair soft and glossy, and cleanse the skin. After giving directions for massage of the legs, abdomen, and back, he directed that the treatment should be terminated in the following peculiar manner, which indicates that he understood the value of nerve-stretching, at least for dogs: "Lift her up by the tail, and give her a good stretching; let her go, and she will shake herself and show that she liked the treatment."

Celsus, the most eminent of all Roman physicians, who lived at the beginning of the present era, was very familiar with massage, and used great discretion in its application.

¹ Genuine Works of Hippocrates, Vol. II, page 16.

He recommended manipulations of the head for the relief of headache, and general manipulations to restore the surface circulation in fever, making this wise remark: "A patient is in a bad state when the exterior of the body is cold, the interior hot with thirst; but, indeed, also, the only safeguard lies in rubbing." Galen, the greatest physician of his time, in the second century recommended massage in many diseases. He seems to have had a good understanding of the various forms of friction and kneading.

A sort of percussion, called whipping, was employed by the ancient Roman physicians in various diseases, and is still used by the Laplanders and the Finns, who beat the body with bundles of birch twigs.

The natives of the Sandwich Islands have, from the most ancient times, employed massage, which they term *lomi-lomi*. They frequently administer *lomi-lomi* to an exhausted swimmer while in the water, supporting him with their hands until his forces are rallied by the manipulations. The Maoris of New Zealand practice massage under the name of *romi-romi*. The accompanying cut (Fig. 3) shows a Polynesian, a son of a chief, administering the treatment. The natives of Tonga Island employ massage under the name of *toogi-toogi*, the literal meaning of which is "to beat," for the relief of sleeplessness, fatigue, etc. In cases of insomnia, the manipulations are confined to the arms and legs.

Paracelsus, the prince of charlatans, who flourished at Basle, Switzerland, four hundred years ago, made great use of massage, and taught it to his pupils in the medical school of that city. Massage has been used in France for two hundred years. It was much employed in the early part of the present century by eminent English surgeons, especially in the treatment of sprains and other injuries of the joints. Its use in modern times, however, is chiefly due to its systematic development and employment by Mezger, of Amsterdam.

STRUCTURES ESPECIALLY CONCERNED IN MASSAGE.

Massage, in its varied applications, has either direct or indirect relation to every structure and function of the body; but in its ordinary applications, this therapeutic measure directly and immediately affects especially the following:—

1. *The skin*, with its connective tissue network, its sebaceous and sweat glands, hair follicles, and the infinite number of minute blood vessels and sensitive terminal nerve filaments—trophic, vasomotor, and sensory.

2. *The connective tissue* lying just beneath the skin, with its rich supply of veins and lymph vessels and spaces

3. *The muscles* which chiefly constitute the fleshy portions of the body, and which receive special attention in the various manipulative procedures of massage, both as individual muscles and as functional groups.

The muscles constitute about one half the weight of the body. They receive about one fourth of the blood. When their vessels are dilated under the influence of exercise or massage, they may contain one half of the blood. The body heat is chiefly generated in the muscles by the oxidation, or burning up, of the glycogen deposited in them from the blood. When the muscles are active, one fourth of the energy set free is expended in work, three fourths in heat. Voluntary muscular exercise expends the energy of both the nerve centers and the muscles. Massage stimulates vital activity in the muscles without taxing the nerve centers. The muscles are constantly active under the influence of the nervous system, even when in a state of apparent rest. This insensible activity is known as muscle tone. It is very noticeable in the abdominal muscles, the tone of which

enables the muscles to act in opposition to the diaphragm, aiding in expiration. Massage increases muscular tone by improving their nutrition.

4. *The large blood vessels*, both veins and arteries, but principally the veins, the circulation of which may be readily accelerated or impeded according as the manipulations are applied in the direction in which the blood runs in the veins, or in the opposite direction. The large lymph channels which usually accompany the larger veins are also brought directly under the influence of massage through appropriate manipulations. The heart itself may be reached by certain special procedures, and is greatly influenced by nearly all forms of manipulation.

5. *The large nerve trunks*, which, with the terminal nerve filaments, are influenced by all forms of manipulation, but especially so by certain procedures which are particularly efficacious in producing stimulating or sedative effects.

6. *All the large viscera of the abdomen*,—stomach, colon, small intestines, pancreas, spleen, liver, kidneys,—which may be brought more or less directly under the influence of massage by a skilled operator; while less directly, but still effectively the lungs and heart may also be influenced by certain procedures.

7: *The bones, joints, and ligaments* must also be mentioned as structures which are directly affected by massage.

The student of massage should make a careful study of the muscles, bones, and joints, and, in fact, so far as possible, of the entire anatomy. To facilitate this study, a number of colored plates have been prepared, which are exact reproductions of the famous copper-plate engravings prepared under the direction of the eminent German anatomist, Bock.

Fig. A

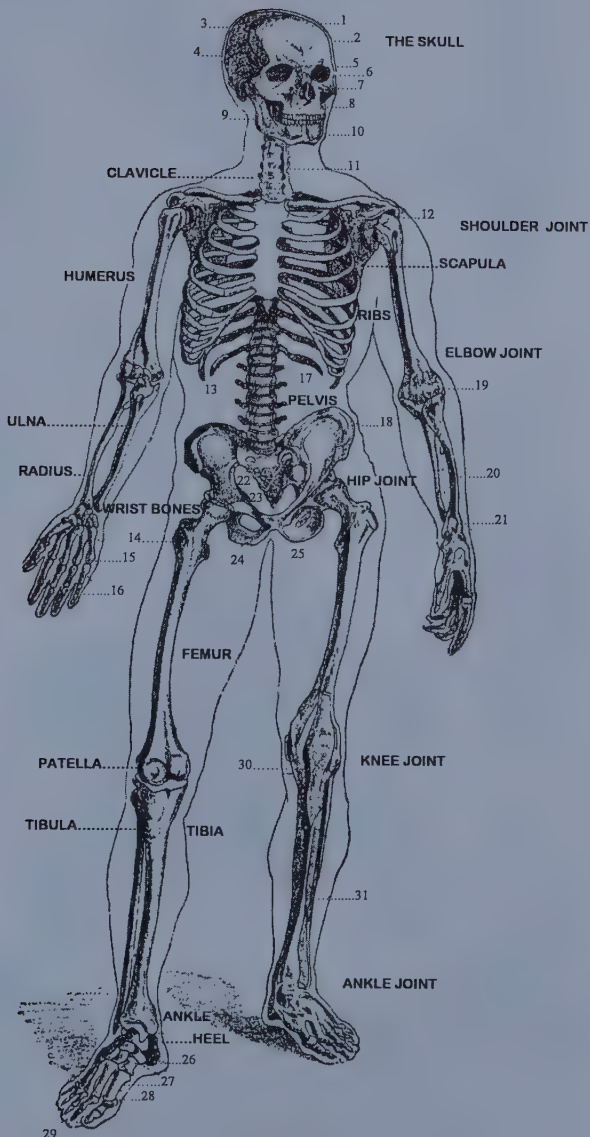


Fig. 4 The Skeleton.

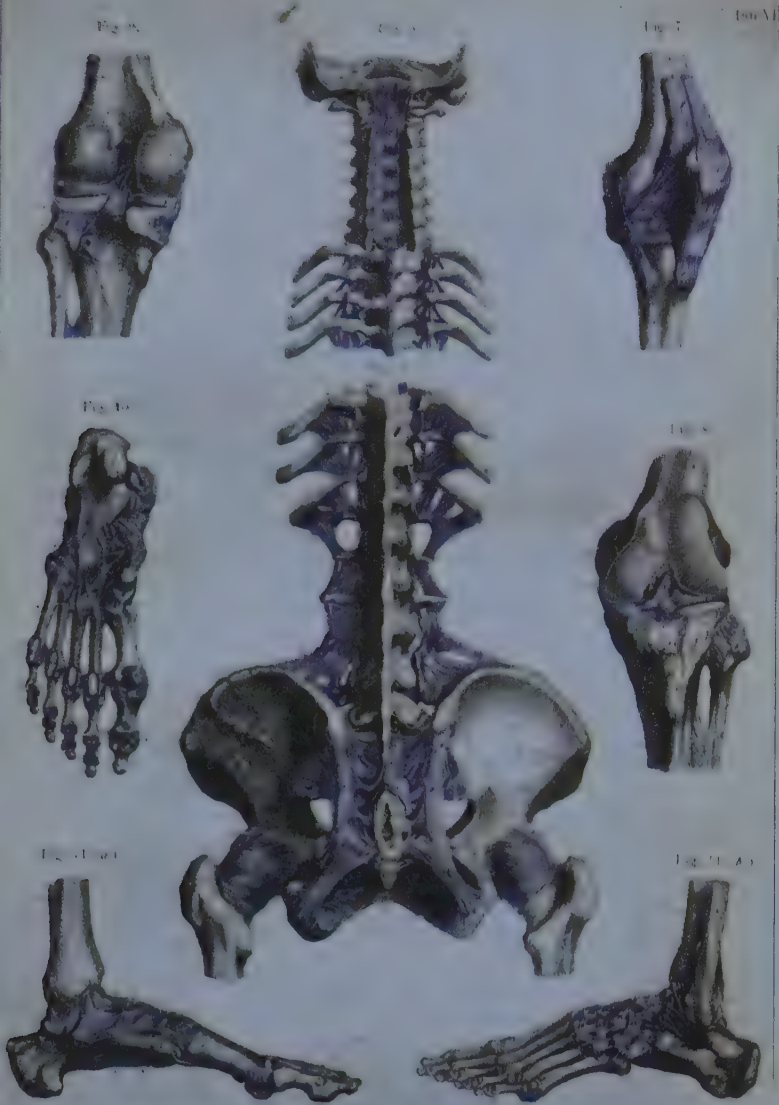


Fig. 5. Ligaments of Neck. Fig. 6. Ligaments of Pelvis and Hip-joints. Fig. 7. Knee Ligamentum Patellæ. Fig. 8. Knee Joint Patella Removed. Fig. 9. Knee Joint Posterior View. Fig. 10. Ankle Joint Front View. Fig. 11a. Ankle Joint - Inner Side. Fig. 11b. Ankle Joint - Outer Side.

PARTS TO BE ESPECIALLY STUDIED BY THE MASSEUR.

A proper understanding of massage and its skillful application requires a good knowledge of anatomy. Physiology is also of the highest value to the masseur, but a practical study of anatomy is absolutely indispensable. This is not the place for a detailed anatomical consideration of the body, but the learner may perhaps be somewhat assisted by the following brief enumeration of some of the anatomical structures with which he must become familiar : —

The Bones.—First of all, the student of massage should make a serious study of the bones (Fig. 4), as in all the manipulations of massage their conformation must be kept carefully in mind. Every bony prominence, hollow, furrow, ridge, articulating surface, together with the points of origin and insertion of the principal muscles; in relation to the skull, the points of entrance and exit of nerve trunks, arteries, and veins; also the joints and ligaments (Figs. 5–11b), should be made thoroughly familiar by a minute and careful study of the skeleton. The following points in relation to the skeleton should receive special attention : —

1. *Head* : Vertex, occiput, parietal eminence, mastoid process, zygoma, temporal fossa, orbit, angle of lower jaw.

2. *Neck* : Cervical vertebræ, vertebra prominens, hyoid bone.

3. *Chest* : Dorsal vertebræ; twenty-four ribs (on each side, seven true ribs, three false ribs, two floating ribs); sternum, cartilages of ribs, xiphoid cartilage.

4. *Arm* : Shoulder bones, consisting of the scapula, or shoulder blade, with its spine, acromion process, coracoid pro-

cess, and glenoid cavity; clavicle, or collar-bone; humerus, or upper arm bone; head, neck, tuberosity, internal and external condyles.

5. *Forearm*: Ulna, olecranon process, sigmoid cavity, styloid process; radius, head.

6. *Hand*: Eight carpal bones, five metacarpal bones, fourteen phalanges.

7. *Spine*: Eight cervical, twelve dorsal, and five lumbar vertebræ; sacrum, coccyx.

8. *Pelvis*: Sacrum, coccyx, ilium, crest of ilium, pubes, tuberosity of ischium, acetabulum.

9. *Thigh*: Femur, or thigh bone—head, neck, great trochanter, lesser trochanter, outer and inner condyles, popliteal space.

10. *Lower Leg*: Patella; tibia—head, outer and inner tuberosities, tubercle, internal malleolus, crest; fibula—styloid process, external malleolus.

11. *Foot*: Tarsus, seven bones—os calcis, astragalus, cuboid, scaphoid, three cuneiform; metatarsal bones, five; phalanges, fourteen.

The Muscles.—The following is a list of the principal muscles (Fig. 12) which are dealt with in the different regions to which massage is especially applied:—

1. *Cranium*: Occipito-frontalis.

2. *Face*: Muscles of mastication, forming the fleshy portion of the cheek, and situated at the back part of the face; muscles of expression, found chiefly about the eyes, nose, and mouth (Fig. 13).

3. *Neck*: Posterior, trapezius; anterior, muscles which act upon the hyoid bone; lateral—sterno-mastoid, platysma myoides, scaleni (Fig. 14).

4. *Upper Back*: Trapezius, supra- and infra-spinatus, rhomboid (Fig. 16).

5. *Lower Back*: Extensors and latissimus dorsi (Fig. 16).

6. *Chest*: Pectoralis, major and minor, serratus magnus (Fig. 15).

B

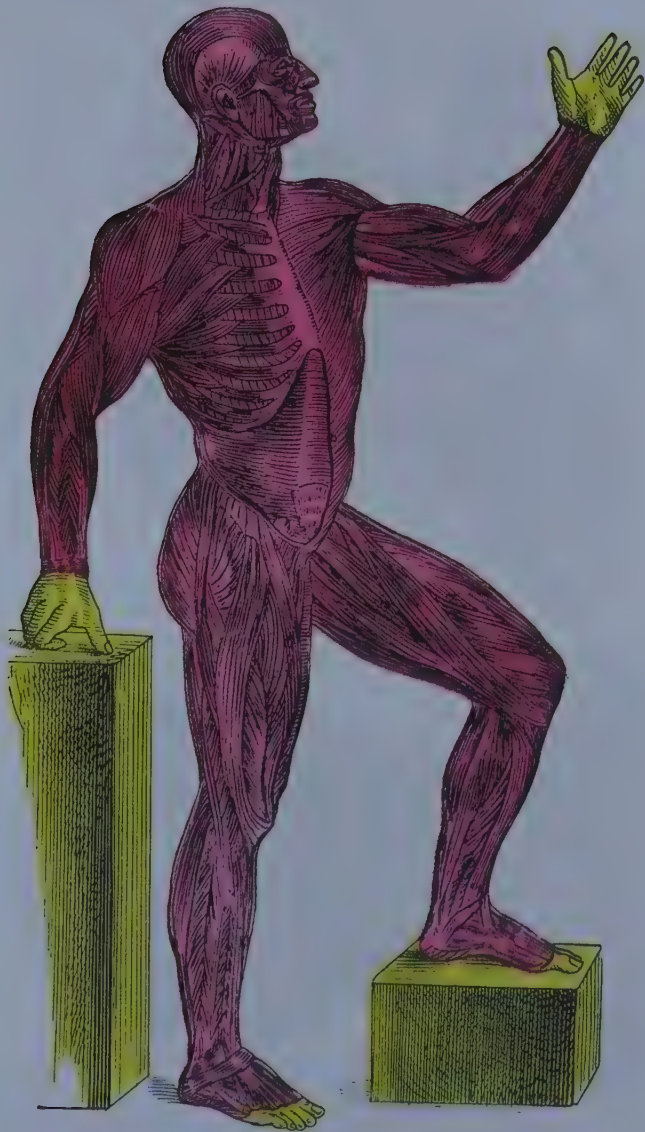


Fig. 12. The Muscles.

PLATE IV.

Fig. 13.

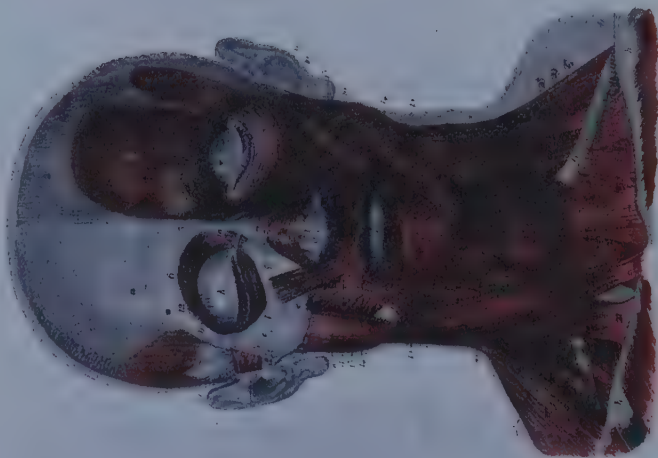


Fig. 13. Muscles of Face.

Fig. 14.



Fig. 14. Muscles of Neck.

7. *Abdomen*: Rectus, external oblique, quadratus lumborum (Fig 15).

8. *Shoulder*: Deltoid and supra-spinatus, which raise the arm; infra-spinatus and teres minor, which rotate arm outward and hold shoulders back; teres major and latissimus dorsi, which rotate arm inward and draw arm to side (Fig 16).

9. *Arm*: Anterior, flexors — biceps, coraco-brachialis, and brachialis; posterior, extensor — triceps (Fig. 15).

10. *Forearm*: Radial (thumb) side, supinators, extensors, and thumb flexor; ulnar (little finger) side, flexors, pronator teres (Fig. 15).

11. *Hand*: Palmar surface — short flexors of fingers; dorsal surface — interossei.

12. *Hip*: Glutei, which rotate thigh outward and inward and abduct it; obturators and pyriformis, which tilt pelvis forward, increasing obliquity of the pelvis (important in relation to correct standing). With thighs flexed upon abdomen, nearly all the muscles of the hip except the obturator externus (which rotates femur outward) act as abductors (Figs. 18, 19).

13. *Thigh*: Anterior, extensors, quadriceps (Fig. 17); posterior, flexors (Fig. 19); internal, adductors (Fig. 20).

14. *Lower Leg*: Inner portion — extensors of foot and flexors of toes, gastrocnemius (Fig. 20); anterior, flexors of foot and extensors of leg, tibialis anticus (Fig. 17); outer and upper — extensors, peronei (Fig. 18).

15. *Foot*: Plantar surface, flexors of toes; dorsal, interossei.

Veins.—The arteries are not so important in massage as are the veins, as they lie too deep to be influenced to any considerable degree by the manipulations ordinarily employed.

1. *Neck*: Jugular (Fig. 21).

2. *Arm*: Axillary and brachial (upper); cephalic (outer); basilic (inner) (Fig. 21).

3. *Forearm*: Radial (outer); anterior ulnar (inner); median anterior, posterior ulnar (posterior) (Fig. 21).

4. *Leg*: Femoral (upper anterior); long saphenous (inner anterior, beginning at arch of foot); short saphenous (posterior

outer, beginning behind the outer malleolus); popliteal (Figs. 22, 25).

The Nerves.—So large a proportion of the physiological effects obtained by the employment of massage being the result of reflex action, it is highly important that the masseur or the student of massage should have a good knowledge of the physiology of the nervous system. The more he knows of anatomy the better, but he must know the names and location of the principal nerve trunks. The location of those which will be mentioned is so clearly shown upon the colored plates that it will not be necessary to do more than name them here.

1. *Face*: Facial, trifacial (Fig. 27).
2. *Arm*: Median, ulnar, musculo-spiral (Figs. 23 and 24).
3. *Leg*: Crural, sciatic (Fig. 25).

The *sacral nerve* passes across the sacro-iliac synchondrosis, or junction of the sacrum and ilium.

The *pneumogastric*, or *par vagum*, is the large nerve from the brain, which passes down the side of the neck, entering the chest just behind the top of the sternum, near the median line. It is distributed to the heart, lungs, and all the abdominal viscera (Fig. 27).

The *sympathetic nerve* controls the function of the digestive organs, kidneys, liver, and other viscera of the abdomen, all the glands of the body, and the action of the heart and blood vessels. Its principal divisions of interest to the masseur are the cervical ganglia, the renal plexus, the hepatic plexus, the lumbar or umbilical ganglia (situated at the back of the abdominal cavity and two inches on either side of the umbilicus), and the subumbilical ganglion, or lumbar aortic plexus, located two inches below the umbilicus (Fig. 27).

The Viscera.—Nearly all the contents of the abdomen and pelvis may be brought under the direct influence of massage. Their general form and normal location should be carefully studied (Figs. 28, 29, 30, 31); viz., the heart, stomach, pancreas, liver and gall bladder, spleen, kidneys (right lower than left), colon, appendix vermiformis, bladder, prostate gland, uterus, Fallopian tubes, and ovaries.

Landmarks and Regions.—While the profound knowledge of surgical landmarks and regions important for the physician is not needed by the masseur, some knowledge of this kind is essential to skillful work. The student is advised to familiarize himself with the following, by the aid of a good anatomy:—

Linea alba, the median line of the body, extending from the sternum to the pubes.

Linea semilunaris, the outer border of the rectus muscle.

Umbilicus, commonly called the navel, located, in symmetrical persons, midway between the end of the sternum and the pubes, normally higher in women than in men.

Poupart's ligament, the fibrous band connecting the anterior superior spine of the ilium with the spine of the pubes.

External inguinal ring, an opening in the abdominal wall just above the spine of the pubes, through which the spermatic cord passes in the male and the round ligament in the female; larger in men than in women.

Femoral ring, an opening below Poupart's ligament, the seat of femoral hernia; larger in women than in men.

Axilla, the armpit, space under the arm bounded by tendons, in front by the pectoral muscles, and behind by the sub-scapular, teres major, and latissimus dorsi muscle. Enlarged glands are often found in the axilla.

Groin, the fold at the junction of the leg with the body, a little below Poupart's ligament. A number of enlarged glands are often felt in this region, even in healthy persons.

Popliteal space, the space underneath the knee. It contains large vessels and nerves, hence too strong pressure in this region should be avoided.

Fold of the buttocks, the furrow just below the buttock, marking the lower border of the large gluteal muscle.

The *regions* of the abdomen may be said to be nine in number, divided by lines drawn upon the surface (Fig. 30),—right hypochondriac, left hypochondriac, epigastric, right lumbar, left lumbar, umbilical, right inguinal, left inguinal, hydrogastric.

THE PHYSIOLOGICAL EFFECTS OF MASSAGE.

I The interest in the therapeutic applications of massage which has increased so rapidly within the last twenty years has led to numerous investigations by able physiologists for the purpose of determining with exactness the physiological effects of the various procedures included under the general term *massage*, and thus obtaining a correct basis for their therapeutic use. Many of these experiments have been repeated and verified by the writer in the physiological laboratory under his charge in connection with the Battle Creek Sanitarium, and some of the results will be recorded in an Appendix, in addition to this brief summary of the conclusions which have thus far been obtained by those who have most carefully studied the subject. These investigations have established beyond all possibility of question, that massage affords one of the most effective means of influencing the functions of the human body.

Experiments clearly show that every function of both animal and organic life may be powerfully influenced by some or all of the numerous procedures of massage. The various effects produced may be included under the following heads:—

- 2** 1. *Mechanical*, in which the tissues are wholly passive, being simply acted upon in a mechanical way by the hand of the manipulator, as in the movement of the blood and lymph in the venous and lymph channels, or the restoration of a displaced viscera to its normal position.
- 3** 2. *Reflex*, in which the peripheral and central portions of the nervous system, both cerebro-spinal and sympathetic, are chiefly active, an impression made upon the nerve ends of



Fig. 15. Muscles of Trunk and Arms—Anterior View.

Fig. 15.

Fig. 16.

Fig. 17.

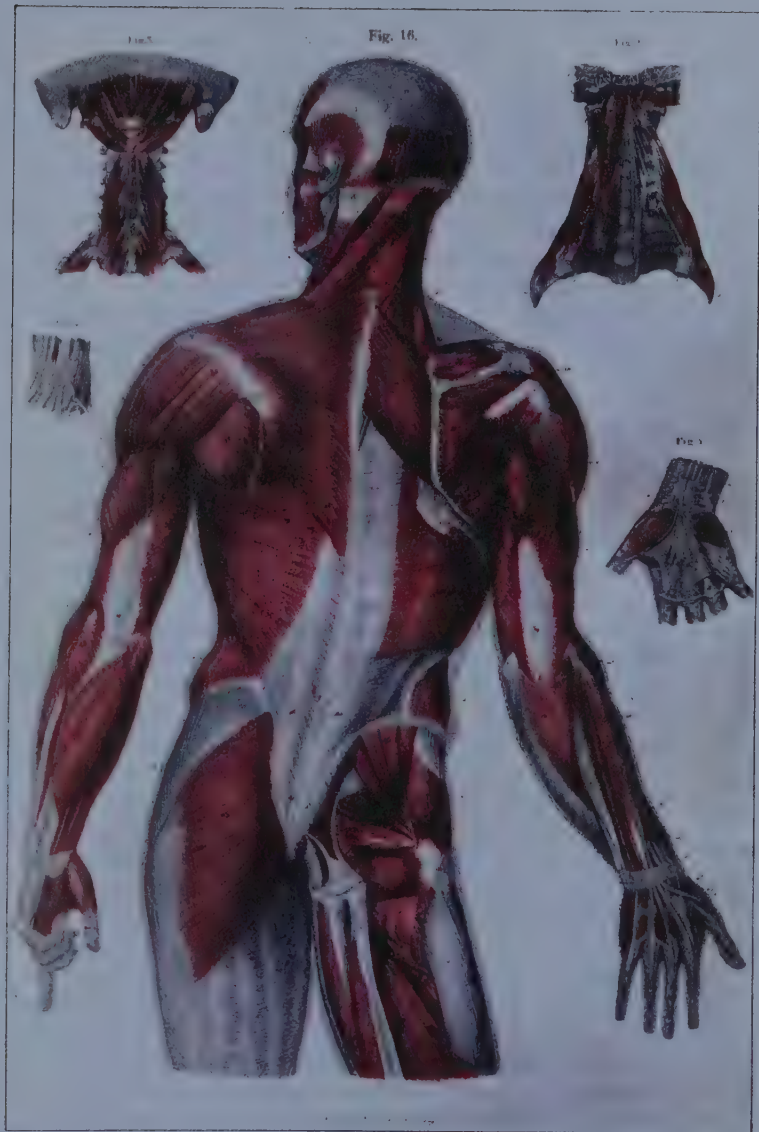


Fig. 16. Muscles of Trunk and Arms — Posterior View.

the sensory or afferent fibers connected with the nerve centers of the cerebro-spinal and sympathetic systems being transmitted to the related centers, where new activities are set up, resulting in the sending out of nerve impulses by which vital changes are effected, not only in the parts directly acted upon, but in related parts.

3. *Metabolic*, in which important modifications occur in the 4 tissue activities both of the parts directly operated upon and of the body as a whole, as the result in part of the direct mechanical effects of massage upon the tissues, and in part of the reflex activities set up by it.

In a brief manual like this there is not space to consider in detail the *modus operandi* of all the different effects of massage. We must be content with a simple enumeration of the specific effects upon the principal systems and functions of the body.

Effects of Massage upon the Nervous System.— 5

All the different procedures of massage produce a decided effect upon the nervous system through the influence of the manipulations upon the nerve endings of both the cerebro-spinal and the sympathetic nerves, which are found in so great abundance in the skin and muscles—the former in connection with the special senses of locality, temperature, pressure, and weight; the latter more especially in connection with the glands, blood vessels, and thermic mechanism located in the skin and muscles.

1. *Direct Stimulating Effects*.—Vibration and nerve com- 6 pression may be made to act directly upon nerve trunks, thereby causing powerful stimulation not only of the peripheral nerves but of all the nerve centers with which a nerve trunk is connected.

Friction is an effective means of exciting languid nerves. 7

Light percussion simply increases nervous irritability, while 8 strong percussion may cause so great a degree of nervous irritability as to exhaust the nerves, and thus produce a benumbing effect.

- 9 Tapping, slapping, clapping, and hacking are the most effective means of exciting nerve trunks.
- Beating and vigorous hacking are especially useful for exciting the nerve centers, and hence are especially applicable to the spine. The nerve centers may also be directly excited by deep vibration and by strong percussion.
- 10 2. *Reflex Effects*.—The reflex effects of massage are very remarkable and exceedingly interesting. All the procedures of massage produce powerful reflex effects. Some of the most striking effects are produced by very light stroking, especially when applied to certain reflex areas. (See Reflex Stroking.)
- 11 Percussion and vibration are also powerful means of producing reflex effects, which include not simply muscular action, but increase or decrease of vascular and glandular activity, and general tissue change.
- 12 3. *Sedative Effects*.—The sedative effects of massage are equally as marked as the stimulating effects. Strong percussion relieves pain in the same manner as does strong faradization, by tiring out and thus obtunding nerve sensibility. Pinching produces an anæsthetic effect in essentially the same way. The physician always pinches the skin before introducing the hypodermic needle.
- 13 Sedative effects are also produced by gentle stroking—the so-called hypnotic effect, doubtless, through reflex influence upon the nerve centers.
- 14 Very marked sedative effects are produced by derivative friction and kneading. Centrifugal friction (rubbing down) diminishes the blood supply of the brain, and hence lessens cerebral activity.
- 15 Light friction over a deep-lying organ diminishes its blood supply by increasing the activity of the overlying vessels, thus causing the blood to go around instead of through it.
- 16 Massage of the soft parts above a joint, and movements of the next joint above, relieve pain by emptying the lymph and blood vessels of the part.

4. *Restorative or Reconstructive Effects.*—Mental fatigue is 17
relieved by massage, through its effect upon the circulation and
the eliminative organs. The toxic substances produced by
mental activity are more rapidly oxidized and removed from
the body, while the hastened blood current more thoroughly
repairs and cleanses the wearied nerve tissues.

General reconstructive effects are experienced by the entire 18
nervous system through the improved nutrition induced by
massage.

Effects of Massage upon the Muscular System.— 19
Massage, when skillfully administered, has to do chiefly with
the muscles. That form of manipulation which consists simply
of skin pinching excites the nervous system and the surface
circulation, but has little influence upon the muscles. When
we reflect that the muscles constitute one half of the bulk of
the body, and receive one fourth of all the blood of the body,
it is at once apparent that any procedure which acts directly
upon them must have a decided influence upon the whole
body.

Although the muscles constantly receive a certain blood 20
supply, this supply is comparatively small except during activ-
ity; consequently, it may be said that "*the muscles are well fed
only when exercising.*" When the muscle is inactive, the blood
goes around it rather than through it; but the moment activity
of the muscle begins, there is a great increase in its blood
supply, even before any acceleration in heart activity has
occurred.

Massage may serve to a considerable extent as a substitute 21
for exercise by increasing the blood supply of a muscle, just
as exercise may be considered a sort of massage, through the
pressing and rubbing of the muscles against each other.
When properly administered, the manipulations of massage
act upon the muscles in such a way as to produce a suction,
or pumping effect, pressing onward the contents of the veins
and lymph channels, and thus creating a vacuum to be filled

by a fresh supply of fluid derived from the capillaries and the tissues.

- 22 *Specific Effects of Massage upon the Muscles.*—Massage in its specific effects upon the muscles, may be said to accomplish the following results :—

1. *To Encourage Nutrition and Development of the Muscles.*—The increased blood supply of the muscle induced by massage naturally improves its nutrition. Experience shows that, when systematically and regularly employed, massage produces an actual increase in the size of the muscular structures. The muscle is also found to become firmer and more elastic under its influence.

- 23 Massage feeds a muscle without exhausting it, in which respect it differs from exercise ; nevertheless, it is not a complete substitute for exercise, for the reason that exercise brings into active play the whole motor mechanism—nerve center, nerve, and muscle—while massage affects chiefly the muscle.

- 24 The improvement in the nutrition of the muscle, as regards increase in size or firmness, is seldom noticeable for the first three or four weeks, and the most marked effects should not be expected until after two or three months.

- 25 2. *To Excite Muscular Contraction.*—A smart blow upon a muscle is one of the ways by which contraction may be excited. By a succession of blows, one following another with sufficient rapidity, tetanic contraction of a muscle may be induced.

- 26 Strong vibration will also cause tetanic contraction of a muscle ; but very rapid and strong vibrations are required to produce tetanus. In voluntary tetanus (ordinary muscular contraction) the number of impulses received by the muscle per second is ten to twenty. It is evident that the rate of vibration required for producing tetanus must be as great or greater, and consequently mechanical means of some sort must be applied, as the highest rate of movement which can be communicated by the hand directly is ten to twelve double movements per second. A vibratory apparatus which I have

Fig. 18.

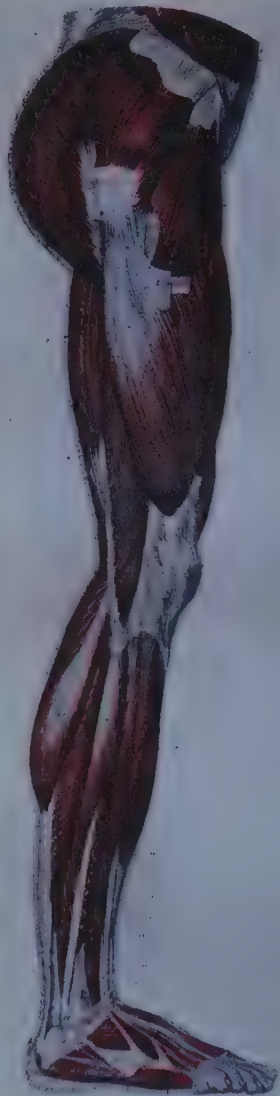


Fig. 17.



Fig. 18. Outer Side.

Fig. 17. Anterior View.

PLATE VIII.—Muscles of the Leg.

Fig. 19.

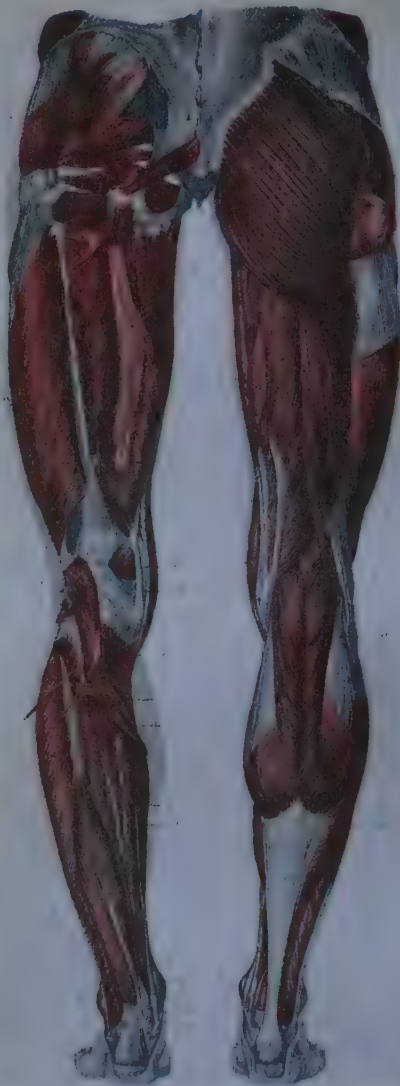


Fig. 20.

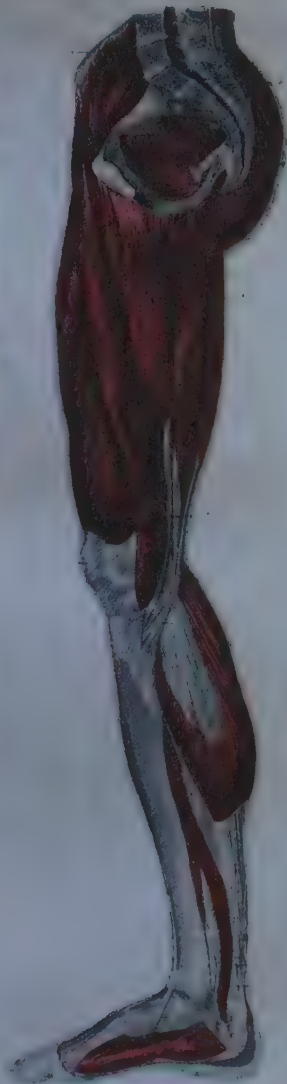


Fig. 19. Posterior View.

Fig. 20. Inner Side.

had in use for many years, and which produces decided muscular contractions, has a movement of thirty per second.

In certain cases, muscular contraction may be induced more readily by the application of percussion than by the faradic current. 27

3. *To Increase Electro-excitability of the Muscle.*—Numerous experiments have shown that massage increases the electro-excitability of a muscle, as indicated by the fact that a smaller number of milliamperes of current is required to cause contraction of the muscle after massage than before. 28

According to Kroneker, however, a muscle is less easily tetanized after massage than before, but its power of action is greatly increased. An abnormal degree of muscular irritability is certainly relieved by massage. 29

This effect of massage may be advantageously utilized as a preparation for applications of electricity in cases in which the electro-excitability of a muscle is diminished by trophic changes, as in infantile paralysis. 30

4. *To Remove the Effects of Muscular Fatigue.*—Ranke, Helmholtz, Du Bois-Raymond, Mosso, and more recently, Abelous, have conclusively shown that special toxic substances are produced as the result of muscle work, and that the phenomena of fatigue are due to the influence of these substances upon the nervous and muscular systems. 31

Abelous has shown that the first effect is a sort of auto-curarization, or paralysis, of the terminal motor plates of the nerves which actuate the muscles, while in advanced fatigue the muscle itself is exhausted by the consumption of the material (glycogen) necessary for work. 32

The fact that a fatigued muscle can be restored to full vigor at once by simply rinsing its vessels with a normal saline solution, as shown by Ranke, demonstrates the toxic character of the phenomena of fatigue. Bowditch, Bernstein, and others have shown that the nerve itself is indefatigable. 33

Zabloudowski has shown that frogs completely exhausted by faradization of the muscles, although not restored by fifteen 34

minutes' rest, were revived at once by massage, and were even able to do twice as much work as before.

- 35 In another experiment, a man lifted with his little finger, one kilo (2 1-5 lbs.) 840 times, lifting the weight once a second. The muscles of his finger were then completely exhausted. After five minutes' massage he was able to lift the same weight 1100 times, and his muscles were even then not greatly fatigued.
- 36 The Sandwich Islanders employ massage under the name of *lomi-lomi* as a means of resting fatigued persons, and sometimes even apply it to restore an exhausted companion when swimming long distances in company. An intelligent native Maori informed the writer that the same method is used by the natives of New Zealand to relieve cramp resulting from cold when swimming in the sea. The term used for massage among the Maoris is *romi-romi*, the literal meaning of which is the same as *petrissage* in the French.
- 37 The stiffness and soreness of muscles which occur from so-called consecutive or secondary fatigue resulting from over-exercise, is also relieved by massage. It should be remembered, however, that secondary fatigue may be produced by too vigorous an application of massage in a person not accustomed to it, especially in those who are very fleshy.
- 38 *Muscular Electricity*. — Physiological experiments have demonstrated that with each muscular contraction an electrical discharge takes place, and Mervy has shown that a muscle is a sort of electrical accumulator, electricity doubtless being generated by the muscular and thermic activities which are constantly present in the muscle. As an accumulator it is auto-excitant, and may also be excited by induction or by contact. In this way the muscles of the person masséed may be favorably influenced through induction from the more highly charged muscles of the masseur. This influence, however, must be very slight, and its therapeutic value can scarcely be said to be established.

Effects of Massage upon the Bones, Skeleton, and Ligaments.—That massage is capable of influencing such hard structures as the bones, ligaments, and cartilages, is clearly demonstrated by numerous facts and observations. A bone has essentially the same blood supply as its overlying muscles. It is for this reason that the same exercise which causes increase in the size of a muscle, at the same time induces growth in the bone to which the muscle is attached. The bones and joints of persons who are much addicted to exercise are decidedly larger than those of persons who have made little use of their muscles. This is especially noticeable in comparing the large, strong hand and knotty knuckles of the laboring man with the puny hand and straight, slender fingers of the man of sedentary pursuits. 39

The blood vessels and lymphatics are largest in the vicinity of the joints, and the change of fluids effected by joint movements, resulting from the action of the muscles upon the bones, necessarily produces increase in the nutrition of the parts, and consequently an increased growth in the cartilages, ligaments, and other structures of the joint. 40

It is now known that the red matter of the bones is the blood-forming tissue of the body. This fact gives a new importance to massage, since the acceleration of the circulation of the blood through the muscles must improve the nutrition of the bones as well as of the muscles, thus favorably influencing the blood-making processes both as regards the quantity of the blood produced and its quality. 41

Effects of Massage upon the Circulation.—Massage profoundly affects the circulation, both general and local, its effects differing, however, according to the mode of application and the part acted upon. General massage increases the rate and the force of the heart beat, as does exercise, with the difference that it does not raise the arterial tension as does exercise, and does not accelerate the heart to the same degree, though producing a full, strong pulse. This is due 42

to the fact that the influence of massage is chiefly upon the peripheral circulation.

43 The vigor of the circulatory activity is increased not only in answer to the greater demand for the removal of the poisons resulting from oxidation as in exercise, but through the mechanical assistance afforded by massage, in moving the blood forward in the venous and lymph channels, and in setting up reflex activities whereby the small vessels are dilated and their activities quickened. The reflex influence of massage acts as a tonic for the heart, while the dilatation of the vessels decreases the resistance so that the heart acts more freely and efficiently in performing its functions. Recent experiments by Brunton, verified by the author, show that general massage produces at first, but briefly, a rise in arterial pressure.

44 Locally, the effect of massage is to produce an active hyperæmia of the part. Under the influence of massage the blood vessels become more active, pumping forward the blood into the veins, through which its flow is assisted materially by the manipulations. The increase of blood is usually accompanied by reddening of the surface and an increase of warmth, sensibility, and general vital activity.

45 Light percussion of the surface causes contraction of the blood vessels of that portion of the skin acted upon. Strong percussion very quickly produces dilatation of the blood vessels which may even amount to paralysis. Light percussion, if sufficiently prolonged, also produces dilatation.

46 When applied to a reflex area, percussion doubtless also excites the circulation in the vessels of the related nerve centers.

47 Massage of the abdomen slows the pulse by raising the general blood pressure. This is accomplished both by the stimulation of the abdominal muscles, thus increasing the intra-abdominal pressure, and also by the stimulation of the vaso-constrictors of the abdominal vessels. At the same time, a collateral hyperæmia of the skin and the abdominal muscles is produced, and thus visceral congestion is diminished.

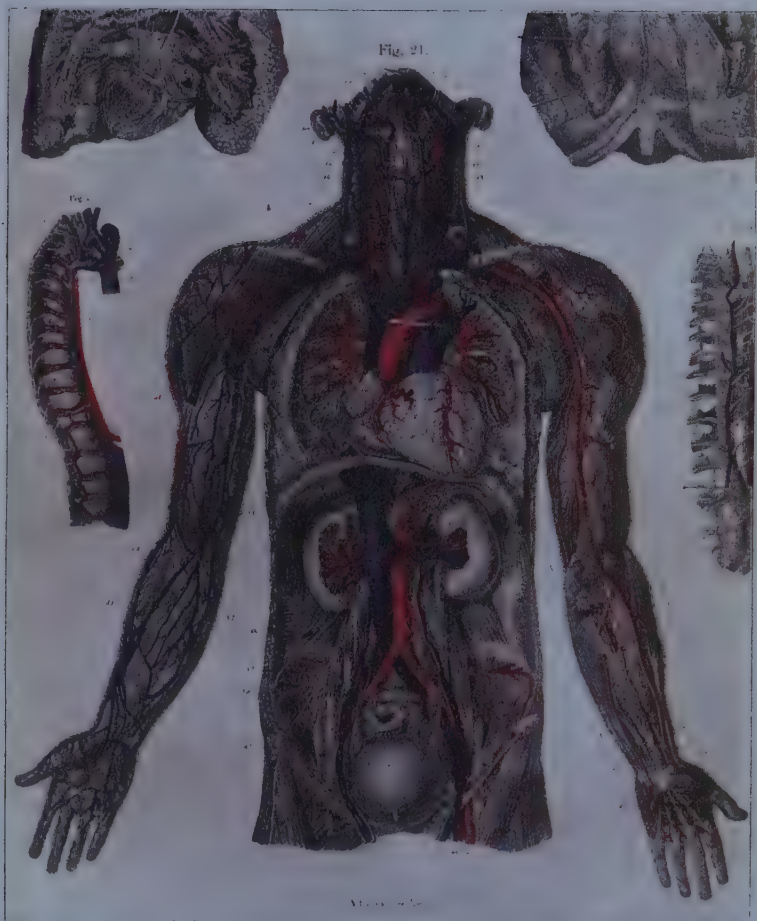


Fig. 21. Blood Vessels of Arms, Neck, and Trunk.

PLATE X.

Fig. 2.

Fig. 22.

Fig. 3.

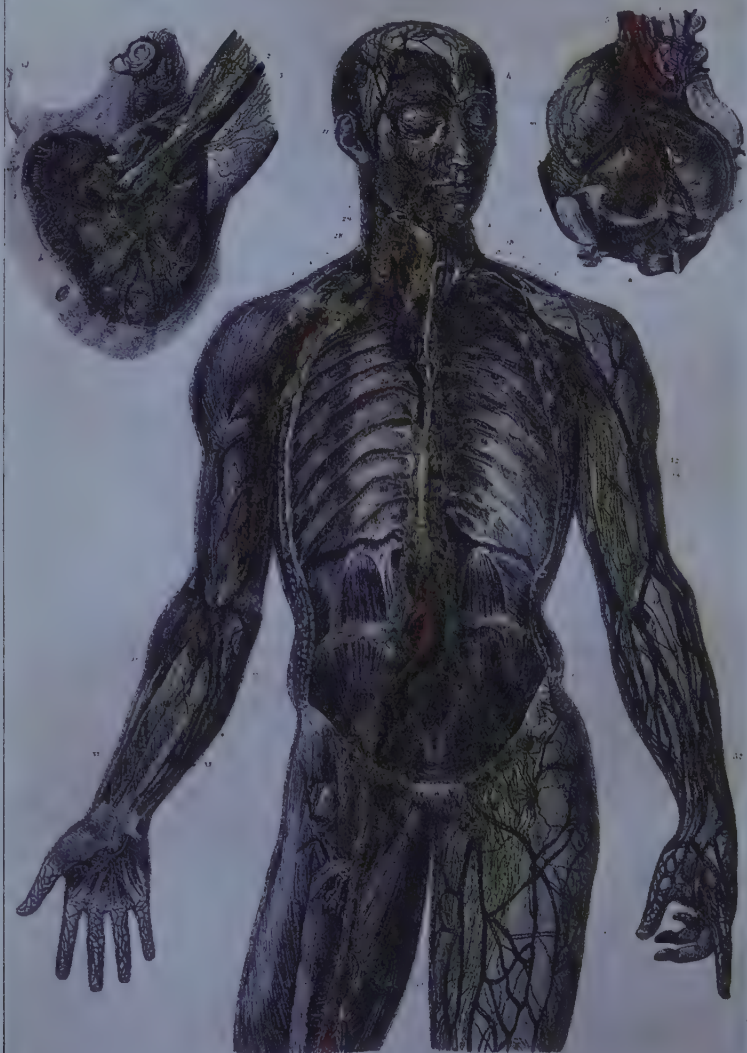


Fig. 22. The Lymphatic System.

Massage has chiefly to do with the circulation of fluid in the 48 veins and the lymph channels, since these are more readily accessible from the surface than the arteries.

Friction acts chiefly upon the superficial veins, while petris- 49 sage and other forms of deep kneading act upon the deeper vessels as well.

Indirectly, the portal and pulmonary circulations are also 50 influenced by massage. Massage of the extremities, for example, especially if concluded with centrifugal friction, may relieve congestion of both the portal and the pulmonary systems.

Massage of the legs acts more directly upon the portal 51 system, while massage of both extremities favorably influences the pulmonary circulation in case of congestion of the lungs. Massage of the arms and legs also acts derivatively upon the brain and spine. For derivative effects upon the brain, however, care should be taken to avoid such exciting procedures as percussion and reflex stroking.

Massage also has a powerful effect upon the circulation by 52 promoting the action of the diaphragm, which serves efficiently as a pump in assisting the circulation, as well as in carrying on the process of respiration. M. Camus has shown by experiments upon dogs that the increase either of the rate or the depth of respiratory movement increases the flow of lymph in the thoracic duct. The same has been shown in regard to the blood circulation by numerous investigators.

The influence of massage upon the lymph circulation is 53 especially worthy of attention. The lymph vessels drain the tissues of waste and toxic substances, and prevent clogging from wandering cells. Lymph channels are most abundant in the subcutaneous tissue and in the fascia which cover and lie between the muscles, so that these vessels are mechanically acted upon in massage, especially by friction and kneading movements.

That massage and exercise of muscles greatly increase the 54 flow of lymph has been repeatedly demonstrated by experi-

ments upon animals, as, for example, it was found that the flow in the lymph vessels of a dog's leg nearly ceased when the animal was quiet, but as soon as the limb was exercised or massaged, the flow of lymph began again (Reibmayr).

55 It has also been shown that the flow of lymph from a limb in a state of inflammation was very easily induced, and was seven or eight times greater than from a sound limb. A swollen limb was found to diminish during the flow of lymph (Lessar).

56 The same author has shown that massage of a lymph gland increases the outflow of the fluid. Deep massage applied to a limb diminishes its size. The central tendon of the diaphragm contains a large number of lymph channels. The diaphragm may be regarded as a great lymph pump, since by its rhythmical movement, the lymph channels are alternately dilated and contracted.

57 Hoffinger has shown that the absorptive power of the peritoneum is greatly increased by massage. In experiments upon rabbits, the peritoneum was found to absorb under the influence of massage twice as much water in an hour as without massage.

58 An experiment made by Mosengeil, an eminent German physiologist, graphically demonstrates the influence of massage in promoting absorption. The joints of rabbits were injected with ink. Massage was applied to some of the rabbits and not to others. In the cases subjected to massage, the swelling which was produced by the injection rapidly passed away. When the rabbits were killed, some months afterward, it was found that the ink had entirely disappeared from the joints which had been massaged, and was found in streaks between the muscles, and accumulated in the lymphatic glands, indicating the course of the lymphatic channels. In cases in which the joints were not massaged, ink was found in the joints, but none in either the muscles or lymphatic glands. This result affords a striking illustration of the value of massage in affections of the joints accompanied by exudate.

It is through its power to promote absorption that massage 59 is of great value in the treatment of local œdemas, general dropsy, and ascites.

Effects of Massage upon Respiration.—These effects may be thus enumerated:—

1. *Increase of Respiratory Activity.*—Massage, as does exercise, increases the depth of the respiratory movements. This is doubtless in some measure due to the reflex influence of massage, but must also be attributed in part to its effect in bringing into the circulation waste products requiring elimination through the lungs, and in increasing oxidation, or CO₂ production, which necessarily accompanies the increased heat production resulting from the effect of massage upon the muscles. 60

2. *Increase of Tissue Respiration.*—It should be borne in mind that the function of respiration is not confined to the lungs. Respiration begins and ends in the lungs, but the most important part of the process is effected in the intimate recesses of the tissues themselves. 61

Massage is certainly a most efficient means of increasing tissue metabolism, by which oxygen is absorbed by the tissues and CO₂ taken up by the blood. This process takes place chiefly in the muscles, through the oxidation of the glycogen, of which they contain one half the total bodily store. Hence it is that massage, by acting directly upon the muscles, increases the tissue respiration by promoting circulation and general tissue activity. 62

In thus promoting the depth of respiratory movement and the intensity of tissue respiration, massage profoundly affects all the bodily functions. Through the increased lung activity there is also increased circulation, as the lungs materially aid the heart in the circulation of the blood. Increased activity of the diaphragm serves to pump both blood and lymph toward the heart with greater vigor. Digestion, liver action, and other of the vital functions come in for their share of benefit in the increased vigor and efficiency of the respiratory process. The functions of the brain are more easily performed on 63

account of the more perfect movement of venous blood and the better supply of oxygen received.

64 Influence of Massage upon the Heat Functions of the Body.—The heat functions of the body being so intimately connected with the circulation and general tissue activity, it is clear that any agent which profoundly affects the latter must also affect the former proportionately. The heat functions consist of three distinct processes,—heat production, heat elimination, or dissipation, and heat regulation. Massage materially influences all three of these processes.

65 The muscles are the chief seat of heat production in the body, containing a great store of glycogen and a special mechanism which, under the influence of the nervous system, gives rise to increase or decrease of oxidation, or combustion of the glycogen. The muscles may be considered as the furnace of the body. During activity, heat production is very active; while during rest, it is considerably diminished. In fever there may be either a great increase of heat production or simply a loss of heat regulation, or both conditions may exist. It is thus evident that those procedures of massage which especially concern the muscles, such as different forms of deep kneading and strong percussion, must exert a powerful influence upon heat production.

66 By actual observation it has been shown that massage of a muscle, as well as exercise, may cause a rise of temperature amounting to several tenths of a degree Fahrenheit. The importance of this fact will be recognized when it is recalled that four fifths of all the food eaten goes to the production of heat, only one fifth of the force represented in the food reappearing as work or energy. This explains the enormous increase of CO_2 in connection with muscular exercise. The quantity of CO_2 eliminated during vigorous muscular effort sometimes rises to nearly five times the usual amount. Muscular waste and weakness in fever is chiefly due to the consumption of the glycogen, which occurs under the influence of the toxic substances present in the tissues during febrile states.

Fig. 25.

Fig. 24.

Fig. 23.



Fig. 23. Superficial Nerves of Arm.
Fig. 24. Deep Nerve Trunks of Arm.

Fig. 25. Nerves of Leg.
Fig. 26. Nerves of Foot.

Fig. 27.



Fig. 27. The Sympathetic Nerves.

The continued activity of the muscles in heat production, 67 even when the body is at rest, is doubtless due to the slight muscular activity constantly present as so-called muscular tone.

Winternitz has shown that under some circumstances heat 68 elimination by the skin may be nearly doubled (increased ninety-five per cent) by friction. He accordingly recommends friction, in connection with the cold bath, for reducing temperature in fevers.

Celsus, the famous old Roman physician, recommended rub- 69 bing in fevers when the surface was cold, although he carefully interdicted rubbing in fevers at other times. The increased heat dissipation resulting from massage is directly due to the increased circulation of blood in the skin. The higher the temperature of the skin the more rapid will be the dissipation of heat from the body. The skin is the principal means by which the blood is cooled, the heat brought from the interior to the surface being dissipated by radiation, conduction, and especially by the evaporation of water poured out of the skin by the sweat glands.

Massage, by dilatation of the blood vessels and accelera- 70 tion of the peripheral circulation, brings an increased quantity of heat to the surface, and at the same time, through increasing the blood supply and by reflex influence upon the sympathetic nerves, it induces increased activity of the sweat glands, which leads them to pour out an increased amount of perspiration. Thus heat dissipation is increased both by radiation and by evaporation as the result of the application of superficial massage.

It thus appears that bodily temperature may be either in- 71 creased or diminished by massage, since by kneading the muscles we may increase heat production, while by friction we may increase heat elimination. It is particularly important to remember that when massage is applied for the purpose of increasing heat dissipation, only such procedures should be adopted as will act upon the surface alone, since any manipulation of the muscles will increase heat production.

- 72 A small amount of heat is communicated to the surface by the hand of the manipulator, and a further small quantity is generated by the friction of the hand upon the surface; but these sources of heat are too small to deserve more than mere mention.
- 73 Another point worthy of notice is the fact that while general massage increases heat production, it does not necessarily increase the bodily temperature, for the reason that the increase in heat production may be more than balanced by the increased dissipation of heat. For example, in a case in which general massage increased the surface temperature 1.4° F., the rectal temperature fell $.8^{\circ}$ F.
- 74 Abdominal massage, however, exercises an effect the opposite of that of general massage. Massage of the abdomen may cause a fall of surface temperature of $.2^{\circ}$ F., while the rectal temperature rises 2.2° F.
- 75 **Effect of Massage upon Digestion.**—There is no single function which may be more clearly demonstrated to be directly encouraged by massage than digestion. By its judicious application, the digestive process is promoted in several ways :—
- 76 1. *By Improving the Appetite.*—The general improvement in nutrition occasioned by the removal of waste and the acceleration of the blood and lymph circulations, creates a demand for an increased supply of nutriment which nature manifests by an improvement in appetite.
- 77 2. *By Promoting Secretion of the Digestive Fluids.*—Massage, especially abdominal massage, through its reflex influence upon the glands and circulation of the stomach and intestines, promotes the production of the digestive fluids in sufficient quantity and quality.
- 78 3. *By Promoting Absorption of the Products of Digestion.*—Hopadzē has shown that massage of the abdomen, for even so short a time as ten minutes, applied at once after eating, diminishes by fifteen to seventy-five minutes the length of time the food is retained in the stomach.

Hirschberg declares that massage of the abdomen hastens the passage of food from the stomach even more efficiently than does either exercise or electricity. This fact the writer has frequently demonstrated.

4. *By Aiding Peristalsis*.—Massage not only aids the 79 absorption of food from the stomach, and its passage from the stomach into the intestine, but also excites the reflexes by which the alimentary mass is moved along in the small intestine to the colon, and finally discharged from the body. Indeed, massage has no rival in its efficiency as a means of promoting intestinal activity.

**Influence of Massage upon Nutrition, Hæmato- 80
genesis, and Phagocytosis.**—That massage encourages the blood-making process is demonstrated by the rapidity with which the number of red blood corpuscles and the amount of hæmoglobin increase in the blood under the influence of this therapeutic means in cases of anæmia. The value of this fact can scarcely be over-estimated. The blood is one of the most important of all the tissues of the body. The total amount of blood contained in the body is about ten pounds, each cubic millimeter of which contains from four and a half to five million corpuscles, making in all 32,500,000,000,000—more than twenty thousand times the entire population of the globe. These little bodies have a combined area of nearly 2900 square meters, or more than 3100 square yards—equal to a square nearly 175 yards on each side. When we consider that this enormous area of blood must pass through the lungs every twenty-two seconds in order to secure the proper amount of oxygen for the tissues, it is readily apparent how great a loss must be suffered when the quantity of blood is diminished ten to twenty or even seventy-five per cent, as in cases of anæmia, and also the great gain effected by a like increase in the number of corpuscles, or oxygen carriers.

Another important influence of massage upon the blood 81 which has recently been noted is the immediate increase in the number of corpuscles produced by a general application of

massage. Winternitz pointed out, several years ago, the interesting fact that by the application of cold water to the surface in such a way as to secure vigorous reaction, the number of corpuscles could be immediately increased from twenty-five to fifty per cent. In one case an increase of more than 1,800,000 corpuscles was noted within half an hour after the administration of the cold bath.

82 Winternitz also showed that exercise has a like effect, and Mitchell, of Philadelphia, has proven the same for massage, and the author has confirmed the observation.

83 It is not to be supposed, as is remarked by Winternitz, that this sudden increase of blood corpuscles is due to a new production of blood cells; the apparent increase in numbers is due to the sudden bringing into the circulation of a great number of corpuscles which had previously been retained in the large vascular viscera of the interior of the body, especially the spleen and liver.

84 Quincke has noticed that the corpuscles accumulate in the capillaries of the liver and spleen in great numbers just before they are disintegrated, which naturally leads to the suggestion that the corpuscles set free by massage, and restored to usefulness by being brought into circulation, are at the same time rescued from destruction by the organs devoted to this work in the body.

Some experiments conducted under the author's direction for the purpose of determining the influence of massage upon the blood, show an increase of from three to seven per cent in the red cells, and from forty to eighty per cent in the white cells. The increase in the blood-count usually became apparent within thirty minutes, and lasted from an hour and a half to two hours. When massage is applied to persons in health, the effect upon the blood-count is, of course, temporary, but when the application is made to persons whose blood-count is deficient, the increase continues for several hours; and if the application is repeated daily, there will be noted a permanent increase in the blood-count from day to day. In this regard the effect

of massage is precisely the same as that of cold applications. By the combination of these two potent measures,—short cold applications followed by massage,—the composition of the blood may be more rapidly and favorably influenced than in any other known way.

Phagocytosis.—This interesting phenomenon, the complete 85 demonstration of which was worked out by Metchnikoff in Pasteur's laboratory, is influenced by massage to a remarkable degree. In the case of exudates in parts which have suffered from inflammatory processes, the removal of the exudate depends first upon its solution. This is effected by the white blood corpuscles, which actually digest the inflammatory products, thus setting them free so they can be carried off by the venous and lymph currents.

Phagocytosis is also the principal means by which the body antagonizes an invasion of foreign microbes which always takes place in connection with infectious disease. Microbes of various sorts, and even animal parasites, such as the plasmodia of malaria, are captured and destroyed by the white blood corpuscles. It is, indeed, through the action of these blood cells that the vital current is kept free from foreign matters of various kinds. They seem to be, in fact, a sort of vital patrol which march up and down the highways of the body, resisting and destroying intruders of various sorts.

It is evident that massage, as already pointed out (81-83), by bringing into circulation an increased number of blood cells, must greatly increase the resisting powers of the body: It is especially worthy of notice that while both the red and the white corpuscles are greatly increased by massage, the white corpuscles are increased in much greater proportion than the red ones.

Massage is also valuable as a regulator of the nutritive 86 processes. Hopadze has proven that massage increases the assimilation of nitrogenous food substances, while Zabłudowski has shown that massage both diminishes the weight of very fleshy persons and increases the weight of badly nourished persons, giving increased appetite and sleep. He showed that

these effects continue not only during the treatment but for some time afterward.

87 **Influence of Massage upon Elimination.**—The chief effects of massage upon elimination are :—

1. *To Improve Elimination.*—In general it sets waste matters free, by encouraging oxidation, by encouraging cell exchanges by which the waste matters are poured into the blood and the lymph currents from the tissues, and by stimulating the flow of the venous blood and the lymph, as well as by promoting general activity of the circulation, thus bringing the waste matters in contact with the organs devoted to their elimination.

88 2. *To Encourage Activity of the Liver.*—The liver requiring oxygen in the various branches of its work as an eliminative organ, its action is greatly encouraged by the increased amount of oxygen brought into the blood by massage. The increased activity of the portal circulation produced by abdominal massage especially aids the liver.

89 Hepatic activity may also be directly stimulated by the application of massage to the liver—especially by vibratory movements and percussion applied over the organ. The fact is worthy of notice that not only hepatic activity but renal efficiency depend upon the integrity and activity of the hepatic cell, which, when stored with glycogen, is capable of transforming leucomaines and various other toxic substances normally produced in the body, into less toxic forms, preparing them for elimination by the kidneys, and also actually destroying ptomaines and other alkaloids which may be taken in with the food or generated in the alimentary canal. Massage, by promoting these important activities in the liver, not only aids elimination through both liver and kidneys, but contributes to purity of blood by the destruction of poisons.

90 3. *To Encourage Renal Activity.*—That massage aids renal activity has been actually demonstrated by experiments upon both dogs and human beings. Abdominal massage frequently gives rise to a copious discharge of newly formed urine.

although massage of the back or loins does not produce the same effect. Abdominal massage doubtless promotes kidney activity through its influence upon the lumbar ganglia of the abdominal sympathetic and the solar plexus.

In experiments made upon a dog, it was observed that mas- 91
sage of the legs also promoted renal activity. The increased secretion of urine was, however, observed to be but temporary, probably because the quantity of fatigue-poisons in the body, the removal of which was especially aided by massage, was soon exhausted. It was found that the same effect was again noticeable after tetanizing the leg, whereby a new quantity of fatigue-poisons was produced.

4. *To Promote Activity of the Skin.*—The activity of the 92
skin is promoted by massage, both in the direct stimulus of the sweat and sebaceous glands and the hair follicles, and also in the reflex influence upon the vasomotor nerves whereby an increased supply of blood is brought to the skin, thus promoting and continuing the glandular activity directly excited. An evidence of this stimulation of the skin as the result of massage is to be seen in the reddening of the surface; the increased perspiration, which may be so great as to interfere with the manipulations; the increased production of oil, which is particularly noticeable in cases in which the skin is abnormally dry at the beginning of a course of treatment; and the increased growth of hair, especially upon the legs and arms. Winternitz has shown that friction of the skin increases the elimination of water sixty per cent.

When it is remembered that the skin is an organ of respira- 93
tion as well as perspiration, its increased activity must be regarded as one of the most valuable effects of massage.

It is also noticeable that massage of the skin increases its 94
reactive power and so gives it increased ability to defend itself against changes in temperature, weather changes, etc.

Local Effects of Massage.—The local effects of mas- 95
sage may be briefly stated to be:—

1. Increase of blood and lymph circulation.

2. Increase in both constructive and destructive tissue change.
3. Absorption of waste or effused products.
4. Development of the muscles, ligaments, and other structures acted upon.
5. Increased heat production and tissue respiration.
6. Reflex or sympathetic effects upon the vasomotor centers, and through them upon the large internal organs,—the liver, spleen, stomach, intestines, kidneys, and the general glandular system of the whole body.

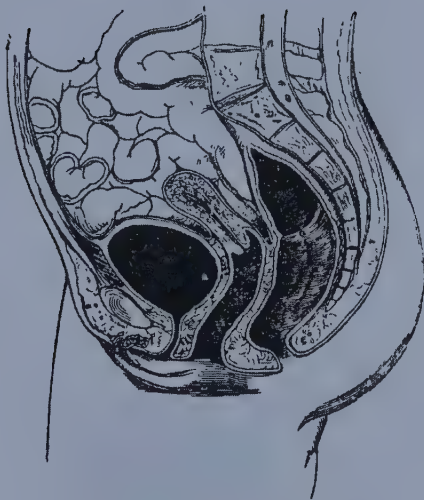


Fig 29. Female Pelvic Organs

PLATE XIV

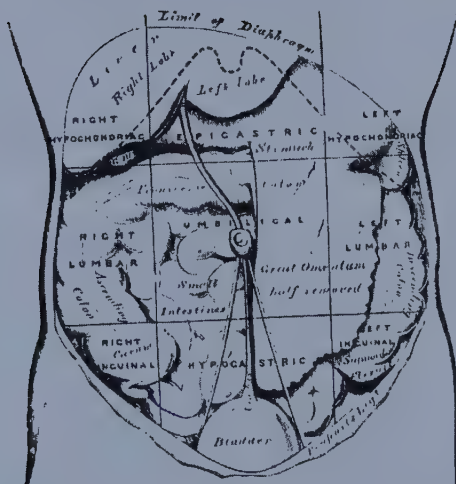


Fig. 30. Regions of the Abdomen

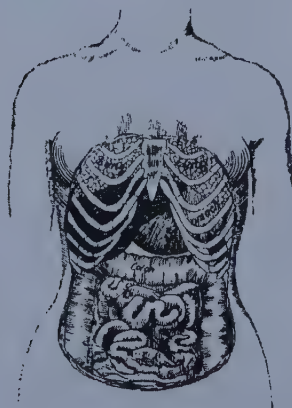


Fig 31. The Viscera in Normal Position

THE THERAPEUTIC APPLICATIONS OF MASSAGE.

As it is not the purpose of this work to enter into an exhaustive consideration of all the different applications of massage, we shall scarcely do more than mention briefly those maladies in which this therapeutic measure has been found most conspicuously useful. It is, in fact, hardly necessary to devote any very great amount of space to the general considerations which alone may be appropriately treated of under this head, since the concise *résumé* of the physiological effects of massage which has already been presented, will, for the intelligent practitioner, serve as the best possible index to its therapeutic applications; while for the masseur, the more specific directions given in connection with the individual measures of massage will be of greater practical use.

Disorders of Nutrition.—Ancient as well as modern 96 physicians have regarded massage as a measure by which the general nutritive processes of the body may be influenced in a most powerful degree. The value of massage as a therapeutic means arises from its remarkable influence upon the circulation (42), the direct and indirect stimulation of the nerves and nerve centers (6, 10), and its remarkable modifying influence upon assimilation, disassimilation, and all the processes of secretion and excretion.

Anæmia and chlorosis are more rapidly and permanently 97 cured by massage than by any form of medication which has been proposed. In connection with a properly regulated dietary and suitable hydropathic measures, massage must be considered as the treatment *par excellence* for these maladies.

- 98 The writer has seen excellent results in a number of cases of myxœdema in which massage was the leading therapeutic agent employed. If not capable of effecting a radical cure in this disease, it must at least be accredited with the power to prevent a further advance of the malady, and as a means of securing a very decided symptomatic improvement.
- 99 In cases of exhaustion from excessive mental, nervous, or muscular work, general massage secures the most marked and satisfactory results, relieving the sense of fatigue in a most wonderful manner, and in cases of muscular exhaustion, restoring muscular power in a remarkably short space of time (31).
- 100 Massage also exerts a decidedly quieting influence upon the nervous irritability and insomnia so commonly accompanying cerebral and nervous exhaustion (12).
- 101 The restorative effects of general massage act with much efficiency as a means of retarding the encroachments of old age, as well as in relieving the infirmities incident to that period. It may be justly considered as a very excellent means of prevention against arterio-sclerosis, especially if employed in conjunction with suitable exercise.
- 102 **Diathetic Disorders.**—While not a substitute for regimen in the treatment of those maladies having their foundation in a morbid diathesis, of which obesity, chronic rheumatism, and diabetes are the three leading types, massage is certainly a valuable adjunct in the management of this important class of disorders. It is of special value in the treatment of obesity, particularly at the beginning of a course, when the patient is too feeble muscularly to undertake the active exercises necessary to effect a change in his nutritive processes.
- 103 Massage is equally useful in cases of rheumatism in which exercise is impossible in consequence of pain, stiffness, or deformity, and also as a means of relieving pain occasioned by the first attempts at exercise.
- 104 Of equal value is massage in the treatment of diabetes accompanied by great weakness or exhaustion, rendering the

amount of exercise necessary for the burning up of the surplus sugar (64) impossible to the patient on account of the feeble condition of his nervo-muscular apparatus. Finkler reports a large number of cases of diabetes mellitus in which great improvement was secured by massage. Zimmer has shown that vigorous muscles, even when at rest, destroy more sugar than do feeble ones, a fact which is easily understood when we remember that the muscles are the furnace of the body, and are the chief seat of the vital combustion by which glycogen, or sugar, is consumed (65, 66). Large and vascular muscles will naturally consume more sugar than feeble and anæmic muscles, just as a large furnace with a good draft will consume more fuel than a small furnace with a poor draft. Under the influence of either massage or exercise, the blood is made to go through the muscles; while in a state of rest it goes round rather than through them. Bouchard also has shown that exercise of the muscles increases the consumption of sugar, and thus diminishes the amount of sugar found in the urine in cases of diabetes. I have often had opportunity to confirm this observation in my own experience in the treatment of this disease.

In the treatment of muscular rheumatism, massage not 105 only relieves the pain accompanying the disease, but also antagonizes the muscular atrophy which is one of its most constant results.

In the treatment of articular rheumatism, massage relieves 106 the pain through its derivative action, and also promotes the absorption of effused inflammatory products, and restores lost mobility. Other observers as well as the author have found massage useful in arthritis deformans, and it has given excellent results in the arthritic neuroses which are so often the result of acute or chronic inflammation and injuries to the joints.

The consecutive or secondary fatigue which is so apt to 107 occur in the employment of exercise in these maladies is more readily relieved by massage than by any other means (31-37).

- 108 Disorders of the Circulatory System.**—Oertel has employed massage of the heart in cases of cardiac weakness with great success.
- 109** Massage and joint movements are of special advantage in cases of chronic diseases of the heart, by aiding the circulation and thus relieving the heart of a portion of its work, whereby it is afforded an opportunity to rally and its nutrition is improved (**42, 43**).
- 110** Centripetal friction of the extremities is the most powerful of all means of aiding the venous and lymphatic circulations in œdema and allied conditions (**54-58**).
- 111** When the heart and blood vessels are excessively active, as after violent exercise, the circulation may be quieted by centrifugal friction. This measure is useful in cases of insomnia from cerebral congestion, over-compensation through excessive development of the heart muscle as the result of valvular disease, or obstruction to the pulmonary circulation arising from disease of the lungs (**50, 51**).
- 112** In Raynaud's disease, or local asphyxia, massage affords a measure of treatment of great importance (**44**). There is, in fact, no single means which can be relied upon as of greater value than local massage systematically employed in the management of this very remarkable malady.
- 113 Diseases of the Muscular System.**—Although disease of the muscles is usually accompanied by disorder of the controlling nerves, the application of massage directly to the muscles is of the highest value in the treatment of most cases of muscular paralysis and paresis.
- 114** In spasmodic diseases, such as chorea, most excellent results have been obtained through the improvement of the muscular tone resulting from suitable applications of massage (**29**), especially when combined with gymnastics.
- 115** In muscular atrophy, whether resulting from neuritis or from disease of the cord, massage of the muscles, especially friction and petrissage, is a measure of the highest value (**22-24**), affording, in fact, the best of all known means by which

the nutrition of a muscle may be maintained while regeneration of the connecting nerve structures is taking place.

Even in fatty degeneration of the muscles, massage may 116 still prove of value. It is not to be expected, of course, that muscles which have undergone complete fatty change will be regenerated; but through the increased nutritive activity set up by judiciously administered massage, those muscular fibers remaining intact may be developed to such an unusual degree that they are able to perform in a very satisfactory manner the functions of the entire muscle or muscular group.

In pseudo-hypertrophy of the muscles, massage furnishes 117 the most satisfactory of all means of combating the morbid process which, left to itself, ultimately results in tissue degeneration and corresponding loss of function.

Diseases of the Nervous System.—There is cer- 118 tainly no class of disorders in which massage has won greater triumphs than in diseases of the nervous system, especially those which are purely functional in character. In the various forms of neurasthenia, massage has, in connection with a suitable regimen, often accomplished results little less than marvelous, as is illustrated not only by the cases published by S. Weir Mitchell, who first systematized the use of massage in this class of nervous disorders, but also by the experience of hundreds of other physicians who have witnessed the effects of massage upon an emaciated, neurotic invalid, when applied by a person thoroughly skilled in its employment.

Chorea, writer's cramp (550-555), blepharospasm, wry- 119 neck, and other maladies in which irregular muscular action, or spasm, is a leading symptom, are more amenable to this measure of treatment than to any other therapeutic means (12-14). Such other painful disorders as facial neuralgia, lumbago, sciatica, crural neuralgia (339, 547-549), and even migraine, also yield to general and local applications, and often in a most surprising manner (12-16).

The curative effect of massage in migraine is due to the 120 fact that it may be employed in such a way as to influence the

sympathetic (160) as well as the central nervous system, since this disease has been clearly shown to be dependent upon a disordered state of the sympathetic, and probably in most cases to a disturbance of the abdominal sympathetic. In rare cases there are found in connection with the disease, and apparently sustaining a causative relation to it, points of induration or thickening in the trapezius and scalmi muscles. Massage locally applied is of special benefit in cases of this kind.

- 121 The various forms of headache are in a high degree amenable to treatment by general and local applications of massage, especially the different forms of headache from which neurasthenic and anæmic individuals so commonly suffer (429-431, 155).
- 122 Even in the treatment of neuritis, massage proves a serviceable measure, provided it is properly employed. It must, of course, be used derivatively in the first stage, and be wholly suspended in the second stage of the disease, while in the third stage, direct and vigorous applications are most effective.
- 123 Anæsthesias, hyperæsthesias (153), and the various forms of paræsthesia — numbness, tingling, crawling, burning, pricking, and other morbid sensations — when of functional origin, quickly yield to suitable applications of massage.
- 124 Even such structural maladies as locomotor ataxia, spinal sclerosis (309, 341), infantile paralysis, and progressive muscular atrophy, not infrequently make more improvement under massage than can be secured by any other means. The writer has seen, in cases of this sort, results which were truly surprising, and far beyond the most sanguine expectations.
- 125 **Disorders of the Digestive Organs.**—In the treatment of the various forms of indigestion, massage, general and local, is second in value only to diet and hydrotherapy. In certain classes of cases, indeed, massage can hardly be said to be second to the important therapeutic agents mentioned, especially in cases in which dilatation of the stomach, prolapse of the stomach or bowels, or other mechanical or static derange-

ments of the viscera are chiefly responsible for the symptoms present (439-450). We need not dwell further upon this point, however, as the application of massage in this class of disorders is considered at length elsewhere in this work (389-424).

Diseases of the Liver.—Although the liver is one of 126 the most important organs concerned in the digestive function, it performs so many and such varied functions that it is proper to consider it by itself. While organic diseases of the liver are only to a very slight degree benefited by massage, nearly all its functional disorders are capable of being very directly and beneficially influenced by appropriate applications of massage and joint movements. In acute inflammatory affections of the liver, massage and joint movements of the legs, carefully administered, are of great value as a means of relieving the general visceral congestion which results from hepatic inflammation, as well as the congestion of the liver itself.

In those conditions of the liver commonly termed torpidity, or sluggishness, massage of the liver itself is a measure of the greatest value. Vigorous percussion over the region of the liver, and kneading of those portions of the organ which are accessible to the hand of the masseur, are of very great value; but even greater value must be attached to general abdominal massage and chest massage combined with breathing movements, by which the stagnating circulation of the liver may be accelerated.

In cases of gallstones, massage has often proved a valuable measure, furnishing a means whereby the gall bladder may be made to discharge its contents into the intestinal canal. Manipulations of this sort must be employed with the greatest discretion, however, and should be trusted only to the hands of a trained masseur acting under intelligent medical direction.

Renal Disease.—Massage is undoubtedly of value in the 127 treatment of certain forms of renal disease, although in this

class of cases it is necessary that it should be used with great care and discretion. This is especially true as regards acute inflammatory conditions of the kidneys, in which the throwing into the circulation of a great quantity of waste matters—leucomaines—by means of massage, might overtax the disabled kidneys.

Massage affords an excellent means of relieving the œdema sometimes present in renal disease, although, of course, it is not to be expected that a radical cure will be effected in all cases of this sort.

- 128 In displacement of the kidney (447, 448), massage locally and skillfully applied is of paramount importance, and in cases of renal insufficiency, massage may often be used with excellent results.
- 129 **Disorders of the Pelvic Organs.**—In diseases of the uterus and ovaries, massage often affords relief which cannot be obtained by any other means (457-488). While cures can seldom be expected in cases of chronic retro-displacement, displaced ovaries may often be restored to position by skillful manipulation; and even in cases in which the uterus and ovaries cannot be permanently replaced, so great improvement in the nutrition of the parts may be effected by massage as to relieve the patient from the distressing symptoms which had previously made life miserable.
- 130 Employed in connection with hydrotherapy, especially the sitz bath, the vaginal douche, and the moist abdominal girdle, with judicious applications of electricity and carefully graduated exercise, general and local massage may often be made to secure the most wonderful results. It is almost always necessary as a supplementary mode of treatment in cases in which an operation has been performed for shortening the round ligaments as a means of correcting retro-displacement. The neglect to employ massage and other curative means in these cases often results in failure to accomplish what might otherwise be effected in a most satisfactory manner, in the

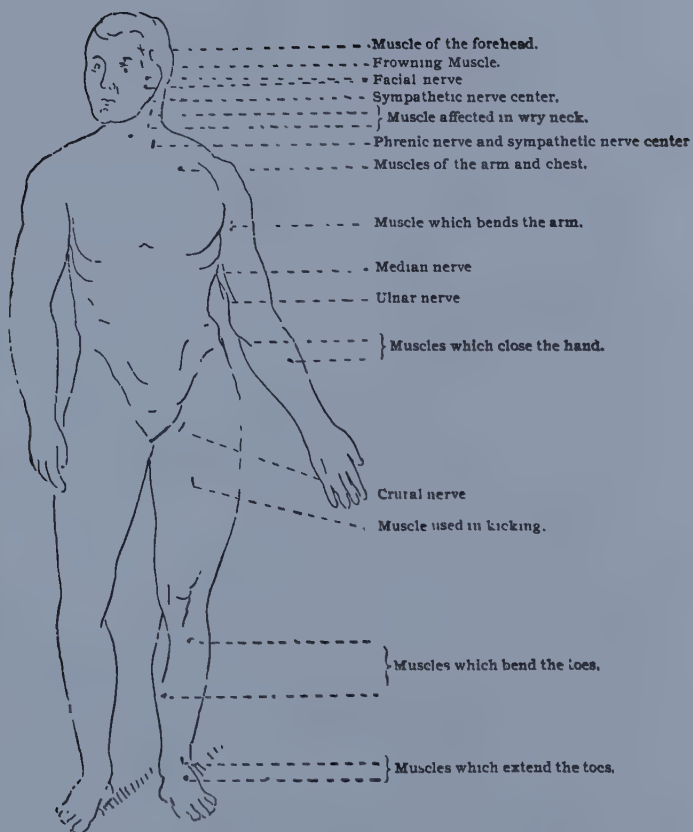


Fig. 32. Motor Points--Anterior View.

PLATE XVI.

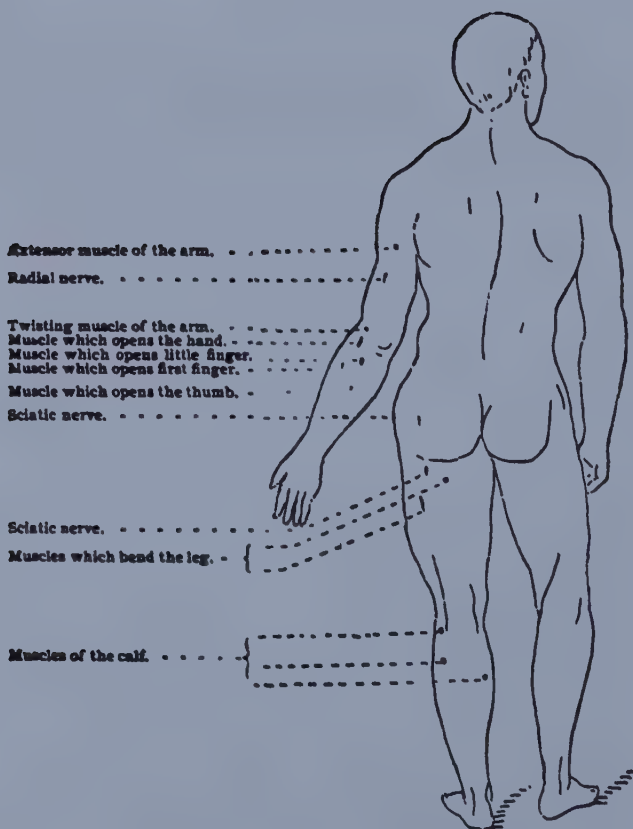


FIG. 33. Motor Points—Posterior View.

PLATE XVII.

relief of this most obstinate, and with ordinary means incurable, class of maladies.

Amenorrhœa and dysmenorrhœa are often more effectively 131 treated by massage than by any other therapeutic means. Massage is useful not only in cases in which the menstrual pain is due to a morbid condition of the uterus, but also in ovarian dysmenorrhœa. In the latter class of cases, indeed, the writer has witnessed the most satisfactory and even remarkable results.

Subinvolution, and many other morbid conditions following 132 childbirth, are most efficiently treated by pelvic massage (457-484).

Among intelligent medical practitioners, massage of the 133 breast (541-543) has almost wholly replaced the old-fashioned breast pump, which has been responsible for so much mischief in cases requiring artificial emptying of the breast in nursing women.

Massage of the prostate (485) has afforded valuable results 134 in certain cases of recent enlargement of this organ as the effect of inflammatory action. In chronic enlargement from hypertrophy, however, very little result can be expected.

Spinal Curvatures.—In the treatment of spinal curva- 135 tures (510-517), massage is an extremely important adjunct to exercise and electrical applications, although it can hardly be said to be a substitute for either of these. By the combination of these three remedies, however, results which seem little less than marvelous may be obtained in suitable cases, but little can be expected when fatty degeneration of the muscles and structural changes of the vertebræ have taken place. In the last-named cases, mechanical support of some kind must be employed.

Pulmonary Disorders.—Massage is of value in va- 136 rious forms of pulmonary disease, especially in chronic pleurisy accompanied by serous exudate. Poliakow reports most excellent results in the treatment of cases of pleurisy with

exudation, absorption having taken place in eight to twenty days in each of the ten cases treated by this method.

- 137** In the application of massage to the thorax to promote absorption, the manipulations should be in the direction of the lymphatics, which run toward the axilla (**380-384**).
- 138** All of the different procedures of massage of the chest should be employed, but special attention should be given to friction and hacking movements.
- 139** Massage, in cases of this sort, is much to be preferred to blisters and other forms of counter-irritation, for the reason that the mild effects which it produces may be daily repeated, and it is accompanied by other results of even greater importance.
- 140** In emphysema, massage may be so employed as to relieve pulmonary congestion and aid expiration (**381**).
- 141** In phthisis the writer has seen excellent results from the use of massage, but it should be remembered that massage, as well as exercise, must be suspended during febrile conditions, as the heat-regulating functions of the body are seriously interfered with in phthisis as well as in acute febrile states. Massage, administered in such conditions, will increase the production of heat, and out of all proportion to the vigor of the treatment, just as so slight an amount of exercise as sitting up in bed will sometimes produce a relapse in cases of typhoid fever after convalescence is well established. The only form in which massage can be employed with advantage, or without risk of injury, is that of light friction. Both centripetal and centrifugal friction (**193, 194**) may be employed. As a rule, centrifugal friction should conclude the seance in all cases in which there is so slight an amount of temperature rise as one or two degrees Fahrenheit, and the patient should rest for at least two hours after the treatment. The best time of day for applying massage in cases of pulmonary disease, is soon after breakfast, or before the daily temperature rise begins. Massage of the chest is especially useful.

Sprains and Fractures (533-537).—The general **142**
plan to be pursued in the employment of massage in the treatment of fractures is the following: When the fracture is reduced, place in an immobilizing apparatus. After three or four days, remove each day and apply massage to the whole limb, taking care to avoid displacement of the fragments. After the massage the splints or other immobilizing apparatus must be carefully replaced.

The massage of the portion of the limb adjacent to the fracture should at first be very gentle, consisting of centripetal friction and fulling movements, the pressure being gradually increased from day to day, deep massage being introduced not later than eight or ten days from the date of the fracture. Light percussion of various sorts may be applied to the whole limb. Deep massage may be applied to the uninjured portions of the limb from the start. The author has found it advantageous to use hot fomentations and alternate hot and cold compresses in connection with massage. At each treatment, the joints which are confined by the splints should be carefully flexed, so as to maintain perfect mobility.

The attention of the profession has been especially called to the value of massage in fractures by Schode, Mezger, Lucas-Championnière, and Berne.

Diseases of the Eye and Ear.—Muscular asthenopia, **143**
glaucoma, corneal ulcer, corneal opacity, and various other affections of the eye, have been successfully treated by massage **(498-500).**

Certain forms of deafness, particularly deafness due to catarrhal disease of the Eustachian tubes, may be not only temporarily relieved but permanently benefited by massage of the ear, neck, and throat **(501-503, 432-438).**

Even acute and chronic nasal catarrh is improved under **145**
careful applications of massage to the face **(489-497)** and neck.

THE PROCEDURES OF MASSAGE.

146 All the different useful procedures in massage may be classified under seven heads, as follows:—

1. Touch.
2. Stroking.
3. Friction.
4. Kneading.
5. Vibration.
6. Percussion.
7. Joint Movements.

Under each of these heads we have several subdivisions, which must be separately considered.

TOUCH.

147 The touch of massage is not simply an ordinary touch or contact of the hand with the body, but is a skilled or professional touch. It is a touch applied with intelligence, with control, with a purpose; and simple as it is, is capable of producing decided physiological effects. This procedure has three different forms of application; viz., *passive touch*, *pressure*, and *nerve compression*.

148 **1. Passive Touch** (Fig. 34).—This consists in lightly touching the part operated upon with one or more fingers, with the whole hand, or with both hands.

Physiological Effects.—The physiological effects of simple touch are:—

149 (1) Elevation of the temperature of a part by the communication of animal heat.

150 (2) A subtle influence upon the nervous system—the so-called hypnotic effect, not due to any occult force exerted or

mysterious qualities possessed by the operator, but simply the reflex influence through the cutaneous nerves upon the centers of the brain and cord, of the gentle contact of a warm, soft hand with the skin.

(3) It is possible that certain electrical effects may result 151 from simple contact of the hand of the masseur with the body of the patient (38).

The effects of simple touch are quite remarkable. Some 152 persons seem to be especially sensitive to its effects, and feel, or imagine they feel, a peculiar influence emanating from the operator, to which the term "magnetism" has sometimes been applied. The hypnotic state is produced in some very susceptible individuals by simple passive touch. The peculiar influence attributed to the touch of certain persons is due, not to any occult power, but to subtle qualities of manner, a peculiar softness of the hand, or some other personal quality not easy to describe.

Therapeutic Applications.—Touch is often remark- 153 ably effective in relieving hyperæsthesias, especially in the region of the head and joints. Pain is lessened, and numbness, tingling, and other sensations are made to disappear. Sleeplessness may also be relieved, and nervous irritability quieted, by simple contact of the hand with the head.

In applications of touch for therapeutic purposes, it is important that the utmost quiet should be preserved. The patient should be required to shut his eyes, if the application is made for the relief of insomnia or general nervous irritability, and should not be allowed to speak, neither should he be spoken to. All noises and disturbing causes should be suppressed, as it is desirable that the patient's mind should become as quiet as possible, and that the sensorium should be protected from the disturbing influence of sensory impressions of every sort.

2. Pressure.—This consists in making light or heavy 154 pressure with the whole of one or both hands or with one or more fingers, upon the head, a joint, or some swollen or irritated part, or upon any portion of the body.

- 155 Physiological Effects and Therapeutic Applications.**—The effect of pressure is to diminish swelling and congestion, and thus to relieve pain. Violent headache or pain in a joint may often be relieved in this way. A person suffering from severe toothache involuntarily makes firm pressure against the painful part. Pressure relieves pain, doubtless both by emptying the blood vessels and by benumbing the nerves.
- 156 3. Nerve Compression** (Fig. 35).—In this procedure strong pressure is made upon a nerve trunk at some point in its course. The points usually selected for pressure are the so-called “motor points,” which are located upon the surface where large nerve trunks are readily accessible, lying just beneath the skin. The accompanying cuts (Figs. 32 and 33) show at a glance the points at which the principal nerves may be most easily reached. The spinal nerves are compressed by placing one finger on each side of the spine and making firm pressure opposite the spaces between the vertebræ.
- 157 Physiological Effects.**—The physiological effect of light pressure upon a nerve trunk is that of stimulation. The slight irritation produced by the pressure is transmitted to the nerve centers which give rise to the nerve operated upon, and thus both the nerve trunk and its centers may be, by repetition of the pressure, excited to almost any degree desired. A good illustration of the stimulating effect of pressure upon the nerve trunk is afforded by the coughing produced by light pressure upon the pneumogastric nerve in the neck, just above the sternum.
- 158** Firm, deep pressure, continued for some little time, produces numbness and may even paralyze the nerve trunk, thus giving rise to a sedative effect. An illustration of this is found in the well-known sensation resulting from a blow upon the ulnar nerve at the point where it comes near the surface, just behind the elbow. The numbness of the little finger and of the inner side of the fourth finger thus induced may last for some minutes, if the pressure or blow has been sufficiently severe.

Stimulation of the pneumogastric nerve is produced by 159 pressure at either side of the larynx just above the upper end of the sternum, the finger being carried backward and slightly below the level of its top, until resistance is felt by the compression of the tissues against the spine. This, however, is a measure which must be used with the greatest care. It should never be employed except under the advice of a physician. Sufficient pressure might easily be applied to produce grave symptoms in a sensitive patient (Fig. 35).

One of the most interesting and striking illustrations of the 160 sedative effects of nerve compression is to be found in the application of this measure to the abdominal sympathetic when in a hypersensitive or hyperæsthetic state. For this purpose the application should be made as follows: With the patient lying upon the back, the knees drawn up and the feet supported, the head—not the shoulders—resting upon a pillow, so as to relax the abdominal muscles, pressure is made at three points respectively, two inches on each side of the umbilicus, and two inches below this point. The tips of the fingers should be placed upon these points in succession, and pressed firmly and steadily toward the spinal column until resistance is felt. Sometimes the surface is so sensitive that the patient contracts his abdominal muscles so firmly that but slight impression can be made upon the tense abdominal wall. In such a case it is necessary to divert the patient's attention from his abdominal muscles. This can be done by making him breathe deeply and regularly. With each expiration, carry the fingers a little deeper into the tissues, until they are pressed against the anterior surface of the spine. The patient will experience some pain when the pressure falls, as it should, directly upon the lumbar ganglia (one on each side of the umbilicus) or the subumbilical ganglion or lumbo-aortic plexus, located two inches below the umbilicus (Fig. 76).

Without making hard pressure, the ganglia, when found, should be rubbed and pressed intermittently for half a minute, at intervals of two or three minutes. After a few applications

the sensitiveness will be found to have disappeared either wholly or in part, unless the cause still continues active. Too great pressure must not be applied at first, as nausea, faintness, and even prolonged pain may thereby be produced.

- 161 Therapeutic Application.**—Pressure is extremely useful in connection with joint massage, affording a means of emptying the veins and lymph spaces and vessels. It should be employed in connection with friction and kneading as a means of emptying the large veins and lymph vessels which are found in the region of the joints.
- 162** Nerve compression is either stimulating or sedative, according to the manner in which it is applied. By a repetition of stimulating applications to the nerve trunk, important alterative effects may be produced, rendering this mode very valuable in many cases of sciatica accompanied by structural changes in the nerve trunk, also in paralysis.
- 163** Nerve compression is one of the most valuable means of arousing the activity of the nerve centers, through the indirect stimulation induced by this procedure.
- 164** In the application of nerve compression in cases of paralysis, the pressure should be light and intermittent, repeated four or five times, the pressure lasting not more than two or three seconds, with an interval of five or six seconds.
- 165** For general stimulation of the spine, make firm pressure with the thumbs close to the spinous processes and opposite the spaces between the spines, or between the ribs near the spine.
- 166** In facial neuralgia, pressure may be made upon the seat of pain or at the nearest point at which the affected nerve is accessible from the surface.
- 167** Intercostal neuralgia is relieved by pressure applied to the intercostal space at the seat of pain, the pressure being directed toward the lower border of the uppermost rib.
- 168** In sciatica and crural neuralgia, pressure may be applied to the affected nerves (Fig. 25). In sciatica, pressure should be made at the points along the junction of the sacrum and

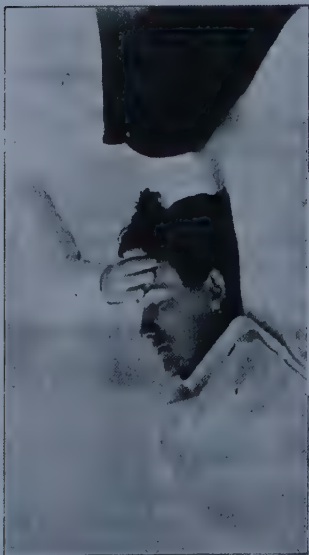


Fig. 34. Passive Touch.



Fig. 35. Nerve Compression

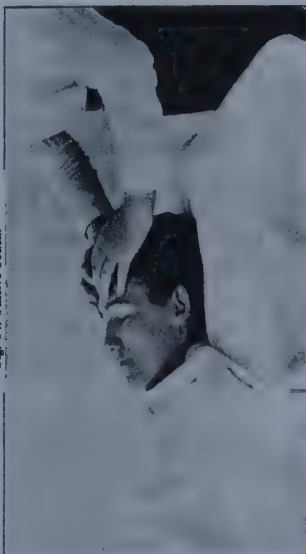


Fig. 36. Stroking.

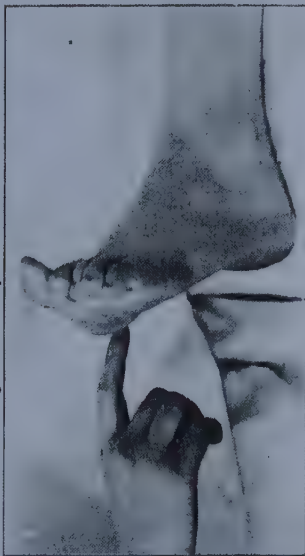


Fig. 37. Reflex Stroking.

ilium, as well as over the sciatic nerve in the hollow of the thigh. The pressure should be sufficient to cause some pain, and should be continued until the pain ceases or the nerve becomes numb.

Pressure is uniformly made, in nerve compression, upon the points at which nerve trunks are most easy of access. This procedure is one that needs to be employed with very great discretion.

STROKING.

This procedure (Fig. 36) is simply touch combined with motion. The tips of two or three or of all the fingers, or the entire palmar surface of one or both hands, should be moved gently over the skin with light contact. In gentle stroking, not even the full weight of the hand is allowed to rest upon the surface, the contact being made as light as possible. 169

The direction of the strokes, or passes, in application to different parts of the body, is as follows:— 170

Head, from before backward, starting at the center of the forehead, and from above downward, starting at the vertex.

Back, from above downward and from the median line outward.

Chest, from the sides toward the median line.

Abdomen, upper part, from the sides inward and upward; middle part, toward the median line; lower part, from below upward and inward.

Arms, from the shoulders toward the hands.

Legs, from the hips downward.

Feet, from the toes toward the heel.

The wrist must be flexible, and the movement even and slow, and perfectly uniform in relation to pressure and time.

Rate of Movement.—The number of passes per minute will, of course, depend upon the extent of surface covered by each stroke, but the hand should not be allowed to move at a more rapid rate than one or two inches per second. The stroking may be repeated many times upon the same place — from 171

two or three minutes to half an hour, or until the desired effect is produced.

- 172 Stroking is always done in one direction only, never to and fro. As a rule, the direction of stroking should be that of the blood current in the arteries, outward or downward from the heart. The direction, as a rule, is the opposite of that of friction. When applied to hairy surfaces, the stroking should be in the way the hair lies, not against the hair, as in "rubbing a cat's back the wrong way."
- 173 There are several forms of stroking:—
1. With the finger tips, *digital stroking*.
 2. With the palm of one or both hands, *palmar stroking*.
 3. With the knuckles, *knuckle stroking*.
 4. *Reflex stroking*.
- 174 **Digital Stroking** (Fig. 36).—The tip of one finger may be used, or the tips of all the fingers of one or both hands. The fingers are held very slightly apart, a little curved, and in a flexible condition, so that all the fingers will fall lightly in contact with the surface. Stroking with the finger tips is used chiefly for the forehead and spine.
- 175 **Palmar Stroking**.—In this procedure the whole or a part of the palm of one hand, or the palms of both hands, should be applied to the surface. It is used for broad, fleshy parts, about the joints and for the soles of the feet.
- 176 **Knuckle Stroking**.—In this procedure the hand is closed, and the knuckles of the second joints of the fingers are applied to the surface. It is seldom used except in massage of the back.
- 177 **Reflex Stroking** (Fig. 37).—In this form of stroking, which, so far as the writer knows, has not been previously described, or systematically employed by others as a therapeutic measure, applications are made exclusively to those parts of the body which have been described by physiologists as areas which may be employed in developing the so-called cutaneous, or skin, reflexes. Light stroking applied to these surfaces produces muscular contraction as the result of the formation of a reflex arc through the spinal cord. These reflexes are

exceedingly well marked in those persons who are said to be ticklish. The reflex is developed by gently stroking the sensitive part with the finger nail. The end of a lead pencil, a wooden toothpick, or the head of a pin may also be employed.

Reflex Areas.—The principal areas which have been described as particularly susceptible in producing reflex influences, are the following : — 178

(1) The skin of the back between the scapulæ, or shoulder blades ; (2) The sides of the chest between the fourth and sixth ribs ; (3) The skin of the abdomen in the mammary line ; (4) The surface at the upper and inner portion of the thighs ; (5) The skin overlying the gluteal muscles ; (6) The sole of the foot. The writer will venture to add to this list, as the result of his observations, another reflex area ; namely, (7) The skin of the axillary region, which in some persons is exceedingly sensitive.

The various reflexes are named partly from their location 179 and partly from the muscular effects produced reflexly by their stimulation, as follows : —

Interscapular.

Epigastric (produces movement at the epigastrium).

Abdominal (causes contraction of the abdominal muscles on one side).

Cremasteric (causes contraction of the cremasteric muscle in males, and probably of the round ligament in females). The writer has noticed that stimulation of the skin of the cremasteric area in girls and women causes a muscular contraction just above Poupart's ligament and in the region of the inguinal canal. This same reflex was observed in the case of a young man whose development had assumed the feminine type in consequence of arrest of development of the testicles.

Gluteal.

Plantar (causes contraction of the muscles of the thigh).

A seventh may be termed the *axillary*.

These reflexes affect not only the cutaneous nerves and 180 muscles which are seen to act as a result of the local surface

stimulation, but necessarily also the nerve centers. The particular portions of the cord acted upon in connection with the several reflexes are as follows :—

Interscapular, sixth to eighth cervical and first dorsal segments.

Epigastric, fifth to seventh dorsal.

Abdominal, eighth to twelfth dorsal.

Cremasteric, first to third lumbar.

Gluteal, fourth and fifth lumbar.

Plantar, fifth and sixth sacral.

The *axillary* reflex, if admitted, is in relation to the second, third, and fourth dorsal, or that portion of the spinal cord lying between the areas excited by the interscapular and the cremasteric.

181 It is a curious fact that firm pressure upon the reflex areas does not develop the reflex, whereas very light stroking may produce so powerful a reflex that one or both limbs will be suddenly drawn up. The reflex is also excited by cold.

182 **Physiological Effects.**—Digital and palmar stroking, when properly applied, have a decided sedative effect; but it is important that the application should be made in a proper manner,—with very light contact, and in the direction of the blood current in the arteries.

183 In friction, the purpose is to increase the circulation of the skin and excite activity, hence the movement is in the direction of the venous blood current. The purpose of stroking is the opposite; namely, to diminish the blood supply. The race horse is always rubbed *down* after violent exercise. The athlete also has himself rubbed in the same manner, after a contest.

Stroking, even when very light, also produces a peculiar effect upon the cutaneous nerves, the action of which, when applied to certain regions at least, seems to be strongly sedative and remarkably quieting.

184 Knuckle stroking is stimulating. It might, perhaps, be more properly called friction than stroking, as it is applied

with more pressure than ordinary stroking. The purpose, when applied to the back, is to excite the posterior branches of the spinal nerves, and thus stimulate the spinal centers.

Reflex stroking is certainly a most powerful means of stimulating the centers of the cord. It must not be supposed that the muscular actions induced by reflex stroking are the sole effects produced. Very active reflex relations exist between the entire cutaneous surface and internal parts. The reflexes named are especially designated for the reason that the muscular effects produced are so apparent as to render them easy of observation and study. The same nerve centers which send branches to the muscles involved in these reflexes, also send branches to internal parts. 185

It must not be forgotten that the organic reflexes, those concerned with the genito-urinary functions and those of defecation, as well as those of secretion and motion as concerned in digestion, have their seat in the spinal cord, so that the same stimulation which excites the gluteal and cremasteric reflexes must also excite, more or less, the nerve centers which control the digestive and the genito-urinary functions. 186

Therapeutic Applications.—Gentle stroking of the forehead in many cases affords relief from sleeplessness. It is not an uncommon thing for a patient to fall asleep under what might be termed the hypnotic influence of gentle digital or palmar stroking of the head. Palmar stroking of the feet will in many cases produce the same effect, especially when employed in connection with stroking of the limbs. 187

Stroking may also be employed advantageously after other procedures in massage, for the purpose of lessening an excessive degree of cutaneous congestion or stimulation which may have been produced. It is especially useful for this purpose when applied about a joint. It is also of value as a means for relieving hypersensitiveness, even when accompanied with inflammation. Certain forms of nervous headache may frequently be controlled in a most decided manner by gentle stroking of the head. 188

189 Neuralgic pains, likewise, are sometimes much alleviated by this means, as are numbness, formication, and a great variety of neurasthenic pains and paræsthesias. Stroking of the forehead produces in some persons a hypnotic effect which is more or less pronounced according to the temperament of the individual. This effect is rarely ever pronounced except in hysterical cases. It is due not to any magnetic or occult influence on the part of the manipulator, but simply to the reflex influence of the nerves involved, acting upon the volitionary centers.

190 *Reflex stroking* is applicable to a variety of conditions, especially the following:—

1. *Interscapular stroking*, used advantageously in spinal anæmia.

2. The *epigastric reflex*, excited advantageously in hypopepsia and motor insufficiency of the stomach.

3. *Abdominal reflex stroking*, especially useful for the relief of constipation and a relaxed condition of the abdominal muscles. It should always be used in connection with abdominal massage.

4. *Gluteal and cremasteric reflex stroking*, advantageously employed in cases of loss of tone in the rectum or the bladder, or in weakness of any of the genito-urinary functions.

5. *Plantar stroking*, usefully employed in cases of the last named sort, as well as in all others in which it is especially desired to improve the innervation of the muscles of the lower extremities.

FRICTION.

191 In this procedure the whole or a part of the hand is moved over the surface with a considerable degree of pressure, the amount varying in different parts—heavy over thick, fleshy masses, light over bony surfaces and thin tissues. The amount of pressure, however, should never be such that the hand will not readily slip over the surface, nor so great as to interfere with the movement of the blood in the arteries.

The principal effect of friction is upon the superficial veins, 192 the large venous trunks, and the lymph spaces and vessels. In the application of friction, the thumb only, or the whole or a greater part of the palmar surface of the hand, is brought in contact with the part operated upon.

Five different forms of friction may be described as follows:—

Centripetal friction(Fig. 38), in which the movement 193 is in the direction of the blood current in the veins, chiefly applicable to the extremities, the movement being from below upward, and from the hands and feet toward the body, the thumb or palmar surface of the hand being employed.

Centrifugal friction, in which the movement is opposite 194 to that of the blood current.

Circular friction (Fig. 39), applicable to the extremities. 195 The limb is grasped by both hands, which make an alternate wringing or twisting movement, beginning at the hand or foot and extending upward.

Spiral friction (Fig. 40), a sort of combination of the pre- 196 ceding, executed with one hand, which progresses from the lower, or distal, to the upper, or proximal, end of the part with a sort of spiral movement.

Rotary friction (Fig. 41), in which the hands are made to 197 move over a broad surface in an elliptical, circular, or semicircular direction; especially applicable to such fleshy areas as the hip and that portion of the back lying above the spines of the scapulæ. In applying rotary friction, it is often necessary for one hand to support the tissues while the other hand is executing the movements.

Rate of Movement.—The rate of the movement will nec- 198 essarily vary according to the length of the stroke, and hence differs in different parts of the body. The rate may be varied from thirty to one hundred and eighty strokes per minute.

Direction of Movement.—The direction of the move- 199 ment in friction must necessarily vary more or less, according to the part operated upon. The general rule is to follow the large veins. Special care should be taken, in the treatment of

the extremities, to follow the large venous trunks, making firm pressure directly over the large veins with the thumbs, passing from below upward.

- 200 In the treatment of the forearm, the masseur will give special attention to the *radial* vein, which runs along the outer and anterior portion of the forearm; the anterior and posterior *ulnar*, which course along the anterior and posterior aspect of the inner border of the arm; and the *median*, which lies along the middle of the anterior surface of the forearm (Figs. 23 and 24).
- 201 In the upper arm, special attention will be given to the *cephalic* along the outer side, and the *basilic* along the inner side, of the arm (Fig. 23).
- 202 In applying friction to the leg, the thumb should at first be passed with firm pressure over the *long saphenous*, the course of which is from the instep along the anterior and inner portion of the leg to the groin; and the *short saphenous*, the course of which is from below the outer malleolus along the outer and posterior portion of the leg to the bend of the knee (Fig. 25).
- 203 Friction is applied to the following parts in the direction designated:—
Head, from before backward, and above downward.
Neck, downward.
Back, above shoulder blades, circular; from shoulder blades to sacrum, down; in the region of the loins, from the sides toward the spine.
Hips, circular.
Chest, from the sternum toward the axilla.
Abdomen, upper part, from above downward and outward; lower part, from the median line downward and outward.
Arms and legs, from below upward.
- 204 To promote absorption, rub toward the heart (centripetal friction).
- 205 For sedative and derivative effects upon the viscera and nerve centers, rub downward (centrifugal friction).
- 206 Rubbing upward, or in the direction of the venous blood current, increases the activity of the circulation.

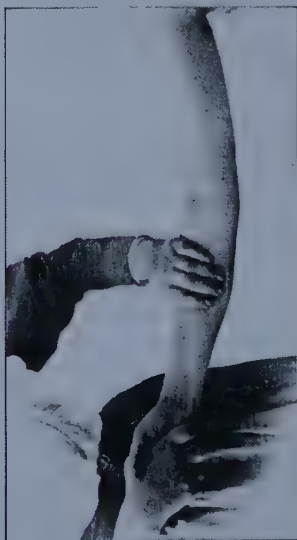


Fig. 38. Centripetal Friction.

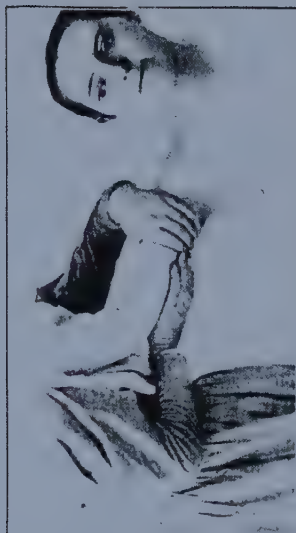


Fig. 39. Circular Friction.



Fig. 40. Spiral Friction.



Fig. 41. Rotary Friction.

Rubbing downward *decreases vascular activity.* 207

In the application of friction, pressure should always be 208
uniform for the part operated upon, and should be carefully
graduated to meet each particular case.

As a rule, some lubricant should be used. Fine vaseline, 209
cocoanut oil, cacao butter, and talcum powder are the best
lubricants.

Friction is applicable to all parts of the body, but is espe- 210
cially useful to the limbs, head, and neck. It should always
be used at the beginning of the application of massage, if the
surface is cold.

In the application of friction to large parts, both hands 211
should be used, either together or in alternation. In the
treatment of a part which is small, it may be steadied by one
hand while being treated by the other.

Mode of Applying Friction to Different Parts. 212

—A systematic order and method is essential in the appli-
cation of friction to different parts of the body, which
may be described for the chief divisions of the body as
follows:—

The Hand.—The patient's extended hand being allowed to 213
rest in one hand of the operator, with the dorsal surface up,
the masseur holding the fingers of his other hand firmly ex-
tended, applies the tips of his fingers to the patient's hand in
such a way that they will fall into the grooves between the ad-
jacent fingers and metacarpal bones. The fingers are then
pushed along in these grooves from the roots of the nails to
the wrists. After repeating the movement several times on
the back of the hand, the patient's hand is turned so that the
palmar surface will be up, and the same movement repeated as
before, with the modification that the fingers are carried a little
farther up the wrist until the heel of the operator's hand rests
in the hollow of the patient's hand, when slight rotary move-
ment and firm pressure should be made, for the purpose of
compressing firmly and emptying the numerous veins of the
fleshy portion of the palm.

The movements upon the back of the hand should be at the rate of sixty a minute ; on the palmar surface a smaller number of movements will be executed per minute on account of the pause for three or four seconds in making rotary friction in the palm after each centripetal stroke.

- 214 *The Forearm.*—With the arm of the patient half flexed, the masseur, facing the patient and operating with both hands, should make strokes from wrist to elbow, first with one hand upon one side and then with the other hand upon the other side of the arm, in such a manner that each hand will include one half the circulation of the forearm, both thumbs resting upon the front of the arm. The operator may, if he prefers, stand with his back to the patient, making the strokes alternately with the two hands, as before.
- 215 The masseur should keep constantly in mind the fact that firm pressure is to be made only with the ascending friction stroke. The hand is allowed to glide lightly over the surface in the descending or stroking movement, as a soothing measure, and not for the purpose of applying friction.
- 216 In the treatment of very feeble persons the patient may be too much fatigued if the operator works with both hands at once, thus leaving him to support his own arm. In such case the patient's arm should be supported by the masseur, who will grasp the patient's right hand with his own right hand, or the left hand with his left, applying spiral friction (Fig. 40) with the other hand upon the front side of the arm, then changing hands to operate upon the back of the arm.
- 217 *The Arm.*—Work the arm in a manner similar to that described for the forearm.
- 218 *The Shoulder.*—In applying friction to the shoulder, the masseur faces the side of the patient, operating with the two hands in alternation, following the surface of the joint, and always taking care to work centripetally ; that is, toward the heart or toward the center of the body, and taking pains to follow the irregularities of the surface. The under as well as the upper side of the shoulder should receive attention.

The Foot.—Begin as with the hand, by friction with the 219
ends of the fingers upon the dorsum of the foot, the operator
standing in such a position as to face the sole of the foot.
After finishing the dorsal surface, change the position so as to
face the side of the foot, and make alternate transverse move-
ments with the two hands on both sole and dorsum, working
vigorously from toes to heel and instep. Lastly, extend the
friction movements to the ankle, working with both hands, and
following up the grooves on each side of the tendon Achilles.

The Leg.—With the leg half flexed upon the thigh, stand- 220
ing facing the patient, the masseur applies friction to the calf
of the leg from ankle to knee, making eight or ten strokes,
then turns his back to the patient, and operates upon the front
of the leg by means of the thumbs working in alternation.

The Thigh.—Standing with his back to the patient, the mas- 221
seur grasps the leg in such a manner that the fingers fall be-
hind and the thumbs in front, and makes very firm but rather
slow strokes from knee to groin, not forgetting to give the knee
due attention.

The Chest.—The patient's arms should be separated a little 222
from the sides, so as to straighten the outer portion of the pec-
toral muscles. The masseur, standing at one side, and facing
the patient's feet, makes strokes from the insertion of the pec-
toral muscles at the humerus toward the median line, beginning
at the upper border just below the clavicle. The two sides may
be operated upon simultaneously, or in succession, both hands
being employed upon one side, one hand following the other
in the movements. In progressing downward, the movement
should be reversed below the pectorals, and the hands should
be carried as far around the sides as convenient, care being
taken to work toward the axilla above, and to follow the direc-
tion of the ribs and cartilages, until the whole surface has been
covered from the clavicle to the lower borders of the last ribs.

The Abdomen.—Facing the patient, the masseur first makes 223
long strokes from the upper to the lower portion of the abdo-
men, one hand following the other over the recti muscles, the

two hands operating simultaneously over the lateral portions. After covering the whole surface six or eight times in this manner, strokes should be made more exactly in the direction of the veins, as follows : At the upper part of the abdomen, make strokes downward and outward, following the direction of the lower cartilages ; for the middle portion, make strokes from the median line outward, reaching around as far as possible ; for the lower portion, make the strokes downward and outward, in the direction of the hip joints.

224 *The Neck*.—Facing the patient, place the hands one on each side of the head in such a manner that the little finger will rest in the groove behind the lower jaw, the other fingers resting upon the mastoid processes, and the inner border of the heels of the hands touching. Move the hands downward, and at the same time rotate them inward, so as to bring as large a portion of the palmar surface as possible in contact with the neck. At the lower border of the neck, move the hands outward toward the shoulders. After a few strokes, carry the hands a little farther back around the neck, so that as they move downward, the thumbs will rest one on each side of the larynx, thus compressing all the veins of the neck, both the superficial and the jugular, which lie deep. Finish with a few strokes applied to the back of the neck, starting at the occiput, and carrying the strokes downward and outward to the point of the shoulder.

225 *The Face*.—Standing facing the patient, the operator places the palmar surface of his hands in contact, then applies them to the patient's face in such a manner that the little fingers touch the forehead at the median line. Separating the hands at the ulnar border, they are gradually spread out as in opening a book, until the little fingers rest upon the temples and the tips of the thumbs fall at the middle of the forehead.

Fixing the thumbs at this point, the outer borders of the hands are moved downward by lateral flexion at the wrist until the forefingers fall at a level with the eyes. The whole hand is then moved downward in such a way that the nose is

grasped and compressed between the thumbs while the palms of the hands and the fingers cover the cheeks. The movement is continued downward, and finished by bringing the hands together below the chin. The object kept in view should be to bring as much of the hand as possible in contact with the face, and to touch every portion of its surface.

The Head.—With the patient sitting or half reclining, and 226 the masseur standing behind, the ends of the fingers and thumbs, with the fingers slightly flexed, are placed firmly in contact with the scalp, and a movement executed similar to that employed by a barber in shampooing. The mistake must not be made of applying the friction to the hair instead of the scalp. The movement begins at the vertex, gradually extending to the borders of the hairy scalp.

The Hip.—In friction of the hip a very considerable amount 227 of pressure is admissible, as the muscles and fleshy masses are very thick and firm. In applying friction to the hips, the masseur may face either the head or the feet of the patient.

1. Make rotary friction upon the two sides simultaneously or in succession. In very fleshy persons it will be found necessary to support the tissues with one hand while operating with the other, on account of the great mobility of the muscular mass and the roughness of the skin so frequently encountered in this region of the body.

2. Apply centripetal friction, working from the great trochanter toward the crest of the ilium, and along the crest of the ilium from behind forward.

The Back.—The patient lies upon his face, the masseur 228 facing his head.

1. A few light strokes are first applied from the occiput to the sacrum, along the center of the back, one hand following the other. The lateral surfaces are then covered by the two hands working simultaneously from above downward, and rotary friction is administered with greater pressure to the fleshy mass lying above the shoulder blade. The two sides may be treated simultaneously or in succession, one hand being

used to support the tissues. The latter method is usually necessary in very fleshy persons.

2. From the shoulder blades to the hips, lateral strokes are made, the masseur standing with his left side to the patient, facing his feet, the hands being placed as far around the sides as convenient, and simultaneously drawn toward the spine, the movement ending with the hands in contact. Great care should be taken to follow the ribs in the region of the thorax, which will give the movements a semicircular direction.

3. Separating the index and middle fingers of the right hand, place one on either side of the spinous processes, and making firm pressure, move the hand downward from the occiput to the sacrum. The object should be to crowd the ends of the fingers as deeply into the tissues as possible on either side of the spinous processes, so as to influence the dorsi-spinal veins. If necessary, the left hand may be used to increase the pressure.

4. Finish the back by a few light strokes from above downward, using both hands simultaneously, covering as much surface as possible with the fingers in contact with each other.

229 Physiological Effects.—The physiological effects of friction are somewhat complex. They may be briefly stated as follows:—

1. Reflex effects upon the vasomotor centers, resulting in dilatation of the small vessels of the skin and increased activity of the peripheral circulation.

2. Mechanical aid to the movement of fluid in the veins and lymph spaces and channels. The beneficial effects obtained are largely due to the existence of valves in the veins and lymph channels, by which the fluid displaced toward the heart is prevented from returning.

3. Friction, which, when applied in a skilled and proper manner, is capable of producing powerful derivative effects.

230 *Reflex or stimulating effects* may be increased by using no lubricant of any kind—in other words, making friction upon the dry skin.

Mechanical effects are increased, and the reflex or irritant effects decreased, by lubrication of the skin. 231

The principal object in the application of friction is to empty the veins and lymph spaces and channels, thus encouraging the circulation. By thus accelerating the flow of the blood and the lymph, vital exchanges are encouraged, and the tissues are freed from the waste matters which they contain. On the whole, friction is one of the most valuable of the various methods of procedure in massage. 232

All the functions of the skin are especially stimulated by friction. Under the application of friction, a dry skin becomes moist and oily through the increased activity of the perspiratory and sebaceous glands. It is also a common observation that friction promotes the development of the hair upon the parts to which it is applied. Professor Winternitz and his students have shown that by the application of friction to the skin, the amount of moisture thrown off may be increased sixty per cent and the dissipation of heat more than ninety-five per cent. Under the influence of friction the temperature of the skin is raised to a very marked degree, both through the dilatation of the surface vessels, which brings more blood to the surface, and by increased production of heat. This is, of course, the cause of the increased heat dissipation under the influence of friction. 233

Therapeutic Applications.—Friction is usually employed therapeutically in conjunction with kneading and other movements, being used in alternation with other procedures. 234

The reflex or stimulant effect of friction is useful in all cases in which the peripheral circulation is defective. Care must be taken in the employment of friction for stimulative effects, that the skin does not become abraded by too long manipulation without lubrication. From five to eight minutes is as long a time as it is safe to apply friction to the dry skin. 235

The mechanical effects of friction, by aiding the venous and lymph circulations, are among the most valuable of all the results to be obtained by massage. It is by the acceleration of the circulation, by means of which a larger supply of white 236

blood corpuscles is brought to the affected parts, thus encouraging phagocytosis (85), that friction is of great value in the treatment of inflammatory exudates, such as usually occur about joints. When used for this purpose, the friction should be applied in alternation to the affected part and to the tissues between it and the heart.

- 237 Friction is especially useful in general dropsy, and in all forms of local swelling, whether due to inflammation or to congestion resulting from a mechanical cause acting upon the circulation. Its efficiency in promoting absorption renders it of great value in sprains, chronic joint enlargements from various causes, sciatica, rheumatism, gout, and even in glandular enlargements. In the treatment of such affections, massage should first be applied to the diseased part and then friction, by the centripetal method, to the tissues between it and the heart.
- 238 The *derivative effects* of friction are of great value in the treatment of inflamed joints, painful sprains, pelvic pains, insomnia, and local congestion of various sorts. In cases of local inflammation the application should not be made directly to the affected or inflamed part, but between it and the heart. By this means the part may be drained of its surplus blood, and the inflammatory process thus be rendered less active or checked altogether. In the case of an inflamed joint or muscle, friction, by operating upon the superficial vessels, diverts the blood from the affected part, causing it to go round instead of through it.
- 239 Pelvic pain may often be alleviated by friction of the lower part of the back. Headache may be relieved by friction of the spine. Cerebral congestion, and the insomnia resulting from it, may often be relieved by centrifugal friction applied to the extremities. The rubbing should be in a direction away from the heart, thus impeding the flow of venous blood and so retaining a considerable amount of blood in the lower extremities, and thereby affording relief to the congested brain.
- 240 In *cerebral congestion* the rubbing should always be downward. In *anæmia* of the brain, rub upward.



Fig. 42. Fulling (Superficial Kneading).



Fig. 43. Rolling.



Fig. 44. Wringing.



Fig. 45. Chucking.

Friction is of value in all conditions of the skin in which its normal activities are impaired. "Hidebound" skins, and conditions in which the skin is dingy, tawny, jaundiced, cold, or otherwise inactive, are benefited by the application of massage. 241

KNEADING.

This is, perhaps, the most important of all the different manipulations in massage, and of all the various procedures is that to which the term *massage* is most appropriately applied, since the meaning of the word is to knead, as a baker kneads dough. In all its varieties, this procedure consists essentially in the application to the tissues of alternate and intermittent compression, by grasping the tissues or by compressing them against underlying bony surfaces. Kneading differs essentially from friction in that the skin of the parts grasped or compressed is held in firm contact with the surface of the hand of the operator, the hand not being allowed to slip along the surface of the skin, as in friction. 242

The different forms of kneading may be divided into two classes; viz.: (1) *Superficial* and (2) *Deep*. There is but one mode of applying superficial kneading, viz., pinching or fulling, but deep kneading may be applied in a variety of ways, the most important of which are *petrissage*, *rolling*, *wringing*, *chucking*, *palmar kneading*, *fist kneading*, and *digital kneading*. 243

1. Superficial Kneading, or Fulling (Fig. 42).—In this procedure the skin is grasped between the thumb and the last two phalanges of the first finger, or in cases in which the skin is very thick, the terminal phalanges of the first and second fingers may be used in opposition to the thumb. The procedure is essentially a pinching movement which acts exclusively upon the skin and the loose cellular tissue underlying it. The skin is simultaneously compressed between the thumb and finger and lifted from the underlying bone or muscle, being released at the moment when the strain is the greatest, so as to secure the maximum effect in emptying and refilling the blood vessels and lymph spaces and channels. 244

The two hands are used in alternation, one hand picking up the tissue as the other drops it, and so following along over the surface in a systematic manner. The direction of the movement in relation to the veins is not important, as this form of manipulation is commonly used in alternation with centripetal or spiral friction movements.

245 Physiological Effects and Therapeutic Applications.—Superficial kneading stimulates powerfully all the functions of the skin, and hence is useful in all cases in which any of the functions of the skin are impaired. It is especially indicated in jaundice, and in cases in which the skin is dry or “hidebound.”

246 2. Deep Kneading.—In deep kneading the object is to act upon the muscles. There is no procedure in massage which requires so much skill, discretion, and anatomical knowledge as deep kneading, since it is necessary to keep constantly in mind the quality of the tissues acted upon, the general condition of the patient, the form of the muscle or muscular group under treatment, and the outline of the individual bone underlying the parts undergoing treatment. The location of the large blood vessels and nerves must also be accurately known and kept in mind, as these structures may easily be injured by the application of too much force.

247 Comparatively little pressure should be used in kneading thin tissues; thick, firm tissues admit of much greater pressure. It is also important to remember that a tolerance of pressure is established by prolonged treatment; so that while very gentle pressure only should be applied at the beginning of treatment, the force may be gradually increased until almost the whole strength of the operator may be employed without injury to the patient.

248 *Petrissage* (Fig. 49).—By this term is designated that form of deep kneading in which the muscular structures are grasped by the hand very much as a baker grasps a mass of dough. The tissue is not grasped between the ends of the

thumb and fingers, but the skilled masseur employs as large a portion as possible of the palmar surface of the hand, taking care to keep the fingers close together. The fingers should not be opposed by the end of the thumb but by the thenar eminence, or the fleshy portion of the thumb. By this means the force employed is spread out over a large surface, and so is transmitted to the deep tissues instead of being expended upon the skin, as would otherwise be the case.

Great care should be taken to prevent slipping of the skin 249 between the fingers. The movement of the tissues should be in the deeper parts, but so great pressure should not be applied as to prevent the deeper parts from gliding easily over the still deeper-lying structures or bones.

In petrissage the parts should not only be squeezed or com- 250 pressed in the hand, but should be lifted from the bone or underlying tissues, rolled and stretched, always in an upward direction in operating upon the limbs, or *from* the point of insertion. Each time a muscle is grasped, it should be at the same time dragged outward from the median line, by which means it will be lifted from the bone, and the underlying tissues will be stretched. The grasp should be released when the strain is at its maximum, so as to encourage to the highest degree the flow of fluids toward the parts operated upon.

The movements of petrissage should not be executed too 251 rapidly; the rate of movement should be about thirty to ninety per minute. Movements are naturally more rapid in the treatment of small parts, such as the fingers, hand, and forearm, than of such large parts as the thigh.

After the area under treatment has been gone over until 252 each part has been grasped, squeezed, rolled, and stretched four to six times, three or four strokes of centripetal friction should be applied, then the petrissage repeated, so alternating three or four times; then proceed to another part.

The greatest care should be taken to individualize muscles 253 or groups of muscles, so far as possible. This is important,

since the blood and lymph circulation of large muscles or muscular groups is to a considerable degree independent, indicating the necessity for separate treatment.

254 Either one or both hands may be used in petrissage; generally the two hands are used in alternation, one hand following the other, or working upon the opposite side.

255 *Rolling* (Fig. 43).—In this procedure the tissues are compressed against the deep-lying structures, and rolled by a to-and-fro movement. In rolling, the fingers are extended and held close together. Rolling may be applied with either one or both hands. One alone is used, being, if necessary, reinforced by pressure with the other hand, in the treatment of broad, fleshy surfaces. In the treatment of the limbs, both hands should be used.

256 If the patient is lying upon the back, the arm will be extended upward, the masseur grasping the arm between the two hands pressed against the sides. The movements should begin at the shoulders, the hands of the operator being slowly carried toward the hand of the patient, and moved in alternation in such a manner as to roll the tissues upon the bone. The pressure should be of sufficient firmness to prevent the hand from slipping upon the skin.

257 In rolling of the leg, the limb should be placed in a half-flexed position, the movements being applied first to the thigh and then to the leg in the manner described for the arm.

258 **Rate of Movement.**—The movement should be executed rapidly — at the rate of two hundred to four hundred per minute. The movement should proceed from above downward, and should alternate with centripetal friction movements; that is, after the whole limb has been rolled from axilla to wrist, or from groin to ankle, three or four centripetal friction strokes should be executed from the lower end of the limb upward.

259 The degree of pressure used should be considerable—in fleshy persons it may be as much as the masseur can apply by lateral pressure of the hands with the arms extended.



Fig. 46. Kneading Fingers.



Fig. 47. Kneading Hand.

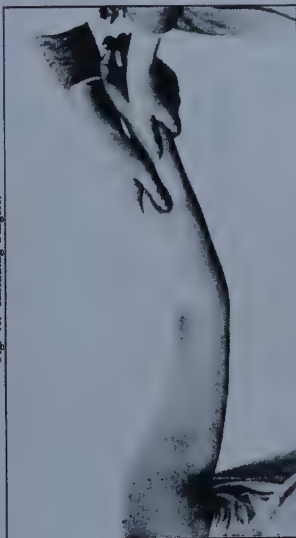


Fig. 48. Kneading Forearm.

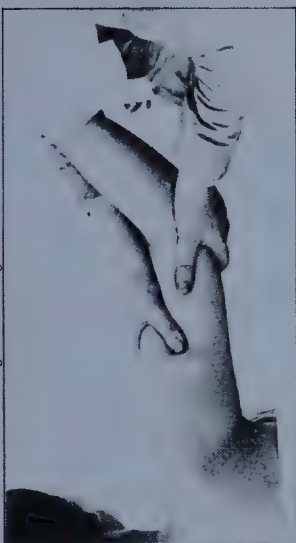


Fig. 49. Kneading Arm.

Rolling is especially useful in masseing the upper portion 260 of the back, the hips, arms, and legs.

Wringing (Fig. 44).—This procedure is executed by grasp- 261 ing the limb with the two hands placed on opposite sides and close together.

Wringing or twisting movements are executed by the hands 262 either simultaneously in the same direction or in alternation. If alternate movements are executed, the hands must be separated a little. Sufficient pressure is employed to prevent the hands from slipping over the surface, as in circular friction.

The movement begins at the shoulder or groin and pro- 263 gresses downward to the wrist or ankle, or it may be made to extend only from one joint to another. This is a very vigorous form of massage, but is obviously applicable only to the arms and legs, and will seldom be called into use.

The movements must not be too rapid; the rate should 264 not exceed thirty per minute.

Chucking (Fig. 45).—In this procedure the limb is sup- 265 ported by one hand while the other firmly grasps the fleshy portion and drags it first upward and then downward in the direction of the long axis of the limb. These movements are executed two to six times, the hands traveling along the surface until the whole limb is operated upon. This application is especially useful in overcoming muscular rigidity and in stretching contracted muscles. It acts powerfully upon both blood vessels and nerves. When employed for the scalp, either one or both hands may be used.

Palmar Kneading (Fig. 53).—This movement is executed 266 either with the heel of the hand or the whole palmar surface, as may be required. When much force is to be employed, the heel of the hand only is used. When a large mass is to be masséed, as in mass-kneading of the abdomen, the whole palm may be employed. It is chiefly used in kneading the back, chest, and abdomen.

Fist Kneading (Fig. 78).—This procedure is used only 267 in kneading the abdomen. It consists in compression of the

deep tissues by the knuckles of the closed fist. Pressure is made along the course of the colon, beginning in the right groin. The advantage in fist kneading is that the greatest degree of force can be employed, and pressure may thus be communicated to the deepest parts.

268 *Digital Kneading* (Figs. 51, 54).—In digital kneading, the ends of the fingers or thumbs alone are employed, the tissues being rubbed and pressed against the underlying bony surfaces; it is used also for operating upon the contents of the colon in abdominal massage. The tip of the thumb or of one finger may be employed alone, or the ends of all the fingers may be used together, the fingers being held close together and extended. Digital massage is chiefly used in masseing the joints, the spine, the head and face, and the abdomen.

269 **Physiological Effects.**—The physiological effect of kneading is to stimulate all the vital activities of the part operated upon. The nerves, blood vessels, glands, also the cell exchanges and other tissue processes are stimulated. By the alternate compression and relaxation, blood and lymph vessels are emptied, and fresh blood drawn into the parts, thus effecting a sort of suction or pumping process by which the old blood and poison-laden tissue juices are forced onward, and a new supply of pure and well-oxygenated blood drawn in. Dilatation and quickened activity of the blood vessels are also induced by reflex nervous action. It is the most effective of all means for producing alterative effects and general vital renovation. Under the influence of massage, the parts operated upon become reddened through the increased blood supply, and acquire a higher temperature, both from the introduction of an increased supply of blood and from a stimulation of the heat-making process in the muscles.

270 Kneading acts more powerfully than any other procedure in massage, in stimulating heat production.

271 **Therapeutic Applications.**—Under the influence of deep kneading, weak muscles increase in size and firmness, demonstrating the value of the method in paralysis and paresis,

and in all cases of tissue weakness and relaxation. By its use, also, enlarged, stiffened, and painful joints return to a normal condition, and inflammatory exudates are broken down and absorbed.

There is no remedy more valuable in the treatment of muscular and joint rheumatism, sciatica, various forms of neuralgia, general defective development, neurasthenia, writer's cramp, convulsive tic, locomotor ataxia, various forms of chronic spinal disease, and in the opening up of closed lymph and blood channels. It is also of great value in the treatment of fractures and sprains. Superficial kneading is especially indicated in dropsy, œdema, jaundice, and all other forms of disease in which the skin is inactive, or in which the functions of the skin are defective. 272

Mode of Applying Kneading to Different Parts. 273

— Begin either with the hands or the feet. If with the hands, proceed as follows : —

The Hand.—The manipulator grasps between his thumb and finger the terminal phalanx of a finger at the root of the nail. Intermittent compression is then applied, while the thumb and forefinger of the manipulator creep along up the finger to its junction with the hand. A sort of pushing and twisting movement is executed at the same time, and attention is given to the sides of the finger, as well as to the palmar and dorsal surfaces. The thumb and each of the fingers may thus be treated in succession, or both hands may be employed at the same time (Fig. 46). 274

After finishing the fingers, the manipulator places the patient's hand in one of his own, with the dorsum up, and with the tips of the fingers of his other hand, works thoroughly between the bones of the patient's hand from the fingers to the wrist ; then, turning the palm of the hand upward, he grasps each side of the palm, and compresses, twists, and rolls the hand in such a way as to draw the tissues away from the median line, to move all the bones, and put a gentle strain upon every muscle and ligament. 275

- 276 In masseing the wrist, it is seized between the thumb and finger of each hand, the thumbs and fingers following all the irregularities of the carpal bones and the lower extremities of the bones of the forearm, the hand in the meantime being slightly moved in various directions to facilitate the process.
- 277 *The Forearm.*—In kneading the forearm (Fig. 48), both hands are used, one grasping the inner, the other the outer, side of the arm, the fingers and thumb of each hand operating together in such a way as to secure thorough squeezing and manipulation of all the soft parts. The two thumbs should follow the median line of the anterior surface of the forearm. The movement is gradually extended from the wrist to the elbow with a rolling, spiral movement, concluding with special attention to the supinator group at the outer part of the arm just below the elbow.
- 278 *The Arm.*—In masseing the arm (Fig. 49), one hand grasps the extensor group of the back of the arm, while the other manipulates the flexors of the anterior region. In masseing these fleshy parts, it must be borne in mind that the chief purpose of the manipulation is to empty the parts of their blood, and to quicken the circulatory processes by which blood and lymph are conveyed through them. This process may be assisted by grasping the muscles of the anterior and posterior portions of the arm in such a way as to drag the tissues away from the large blood vessels which pass through the arm just beneath the inner border of the biceps muscle (Fig. 16).
- 279 *The Shoulder.*—The deltoid is masséed by seizing it just below the point of the shoulder, the two thumbs grasping the central portion while the fingers work the edges of the muscles. The movement is carried up over the point of the shoulder, and then repeated.
- 280 Attention should also be given to the supraspinatus and infraspinatus muscles, and also to the teres muscles, which help to form the posterior boundary of the axilla. The supraspinatus and infraspinatus muscles must be masséed by the ball of the thumb or the ends of the fingers; the teres muscles,

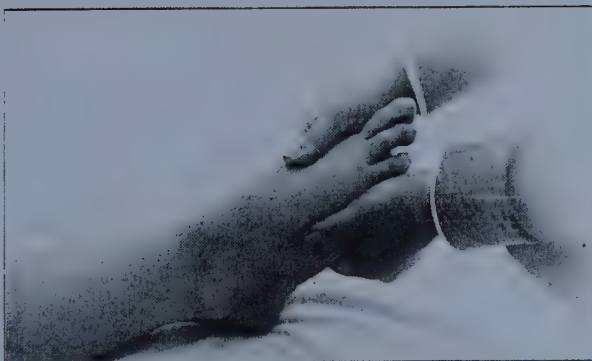


Fig. 50. Kneading Foot.

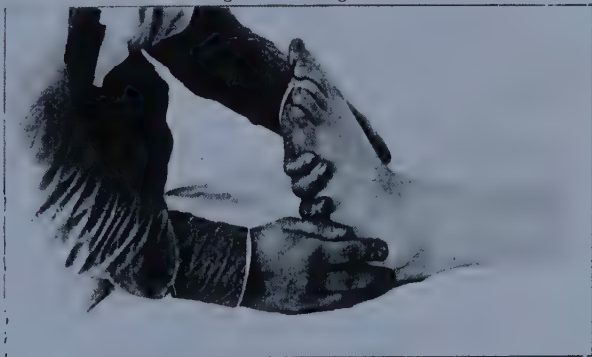


Fig. 51. Kneading Ankle.

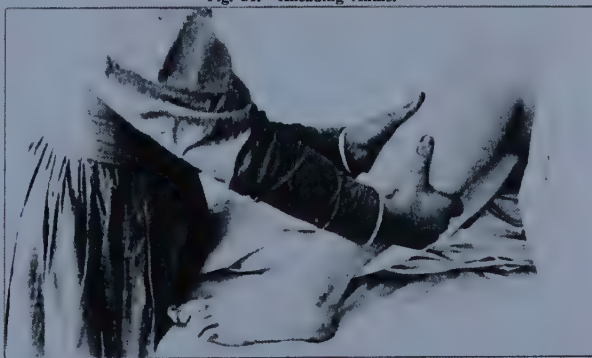


Fig. 52. Kneading Leg.

by grasping between the thumb and fingers the soft tissues beneath the arm which form the posterior boundary of the axilla, or armpit. It is important that these muscles should not be neglected, as they act an essential part in holding the shoulders back, and are generally weak through neglect to bring them into active use by the maintaining of a proper poise in sitting and standing.

The Foot.—The feet are manipulated (Figs. 50, 51) in essentially the same manner as the hands. The dorsum of the foot and the ankle are masséed with the ends of the fingers; the tissues of the sole are stretched in the same way as those of the hand. The foot should be rolled by compression of the sides between the two hands in such a manner as to act upon the ligaments and excite activity of the circulation in the deep structures. These manipulations are especially important in cases of flatfoot, or cases in which the instep is low, indicating a tendency to the development of flatfoot. 281

The foot is finished by grasping the heel in the palm of the hand, rolling and compressing it, and working about it with the ends of the fingers and thumbs. 282

The Leg.—The leg is manipulated (Fig. 52) in essentially the same manner as the arm, one hand seizing the fleshy mass of the inner and posterior region, the other the outer and anterior, working from the ankle up to the knee. The thumbs should be well worked between the different muscular groups, special attention being given to the peronei muscles at the upper and outer part of the leg, by pressing the tips of the thumbs down between this group and the tibialis anticus. The tibialis anticus lies in such close relation to the tibia that it is not easy to grasp it between the thumb and fingers, and thus lift it from the bone. A similar effect may be obtained, however, by rolling the muscular masses which lie upon the anterior and outer side of the tibia away from the crest of the bone by pressure with the thumbs. 283

The Thigh.—Grasp the quadriceps with one hand, and with the other grasp the adductor muscles which lie along the inner 284

side of the thigh, working the two groups simultaneously, but with alternate movements of the hands.

Changing hands, grasping the quadriceps with one, and the biceps, or outer hamstring muscles, with the other, a similar manipulation is carried along the outer side of the leg from the knee to the hip.

Then, grasping the whole limb between the two hands, the thumbs running along the anterior surface, while the fingers are applied to the posterior region, the whole mass of tissue of the posterior region may be manipulated with the fingers. Care should be taken to drag and stretch the muscles away from the large blood vessels which pass down along the inner border of the quadriceps.

285 In manipulating the thigh, unless the patient is very feeble, a considerable amount of force may be employed, as the skin is thick and the mass of tissue great.

286 *The Back* (Fig. 53).—The patient should lie upon the face, with the hands crossed under the forehead. This position secures good separation of the scapulæ without rendering the rhomboid muscles too tense to prevent manipulation of the large masses of muscular tissue beneath.

287 Starting from the base of the skull, work downward, stretching the tissues by pressure of the thumb upon either side of the spinal column, employing the fingers at the same time as much as possible upon the more superficial tissues lying at a distance from the spine. These movements should be made in alternation, not together, since when made together there is danger of excessive stretching of the skin over the line of spinous processes.

288 In persons with thick, rigid tissues, manipulation of the back may be performed by the flat surface of the hand pressed firmly upon the tissues, the pressure being increased, if necessary, by reinforcement with the other hand.

289 After manipulating the large muscular masses of the back from the base of the skull to the sacrum in the manner directed, make deep pressure alongside of the spinous processes

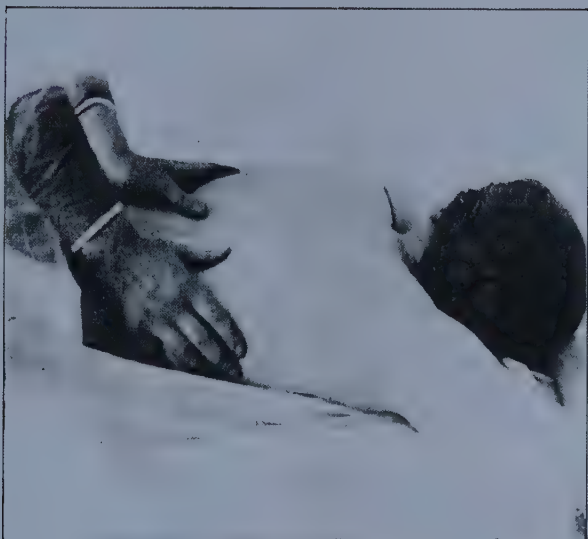


Fig. 53. Palmar Kneading of Back.



Fig. 54. Digital Kneading of Spine.
PLATE XXIII. Kneading

with the ends of the fingers, thus crowding the large muscular masses away, and bringing pressure to bear upon the dorsi-spinal veins and upon the ligamentous structures which bind the vertebræ together. Work down first one side of the spine, then the other.

Another manipulation (Fig. 54), which is very effective and 290 should not be forgotten, is a form of digital kneading which consists in placing the ends of the fingers on each side of the spine in such a manner that the fingers are parallel with the spinal column, and then making short but steady and uniform movements to and fro in the direction of the spine, working from above, downward.

Still another valuable form of kneading is executed as fol- 291 lows: Place the two hands, one upon each side of the spine, at the lower part of the back, and work the fingers in such a manner as to make the finger tips creep up the spine in a hitching fashion, dragging the heels of the hands after them. Return by an opposite movement, the heels of the hands leading.

Similar movements may also be executed from the spine out- 292 ward, following the direction of the ribs. In these movements, the thumbs, the fingers, or the heel of the hand may be the fixed point.

Another form of digital kneading is administered thus: 293 Facing the side of the patient, place the thumbs upon the spine, the fingers reaching over upon the opposite side, the wrists slightly raised. First make firm pressure with the ends of the fingers, then drag the tissues toward the median line. Apply this movement from the occiput to the sacrum and back upon one side, and then treat the opposite side in the same manner.

An effective manipulation of the extensor muscles of the 294 back consists in working the heels of the hands from the sacrum to the base of the skull, then working down, applying the knuckles of the closed hand with a vibratory movement.

Avoid too much pressure over the spinous processes, as it 295 will be likely to injure the skin and produce unpleasant abra-

sions. It should be remembered that the skin of the back is much less sensitive than that of other portions of the body, so that injury may easily be done without eliciting complaint on the part of the patient.

296 *The Chest.*—The tissues of the chest are extremely sensitive, hence care must be taken to avoid bruising them. This region is masséed by rolling movements effected by the flat of the hand pressed firmly upon the tissues, by intermittent compression, and by ordinary deep kneading with the thumb and fingers, executed with care to avoid pinching. Much less force should be used upon the chest and abdomen than in masseing the back. The tissues may be gently dragged away from the median line by the hands placed one on either side, the traction being from the origin toward the insertion of the pectoral muscles.

297 Many neurasthenic patients present tender points between the ribs, especially in the axillary line and near the sternum, and also, in some instances, in the region of the heart. Care must be taken to avoid painful pressure upon these points.

The Abdomen.—Kneading of the abdomen involves so many special procedures that a particular description will not be given under this head, the subject being more fully dealt with farther on. The same remark applies to kneading of the head, face, neck, and several other special regions.

VIBRATION.

298 This procedure consists of fine vibratory, or shaking, movements communicated to the body through the hand of the masseur. One or both hands may be placed against the surface, or may grasp some part of the patient, as the hand, the foot, or the head. Sometimes one hand and sometimes both hands are employed. Vibratory movements may be communicated to the body in a variety of ways. The following are those which may be most conveniently and efficiently employed : —

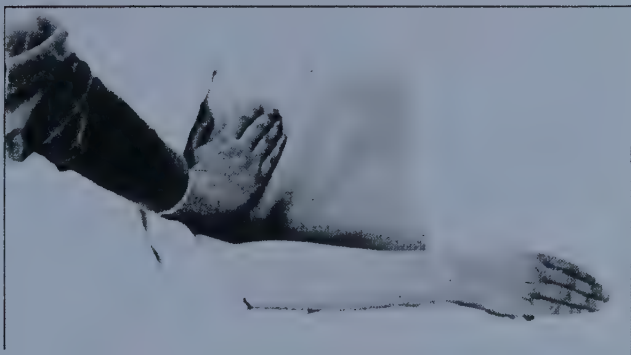


Fig. 55. Deep Vibration.

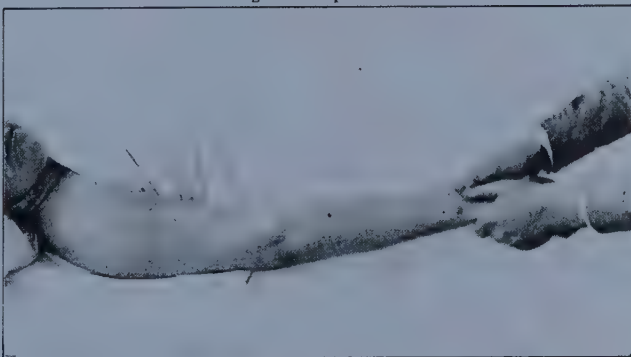


Fig. 56. Shaking.

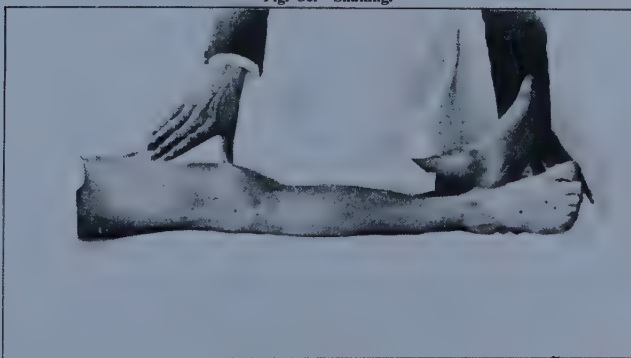


Fig. 57. Digital Vibration.
PLATE XXIV. Vibration.

Lateral Vibration.—The palmar surface of the hand being held upon the skin with sufficient firmness to prevent slipping, the hand is moved laterally to and fro. The movements should be as rapid as possible—at the rate of at least six to ten per second. It is used chiefly in applications to the head, the joints, and the abdomen. The finger tips alone are used for the head and joints, the palm of the hand in abdominal and pelvic massage. 299

Knuckle Vibration.—The knuckles of the closed hand are placed in contact with the skin, and moved slowly over the surface, a vigorous vibratory movement being executed at the same time. 300

Superficial Vibration.—One or both palms being placed upon the surface, they are made to move slowly over the area to be operated upon, a fine trembling movement being executed at the same time. Much practice is required to enable the masseur to execute this movement with sufficient vigor to produce an effect. 301

Deep Vibration (Fig. 55).—The palm of the hand or the closed fist being placed firmly upon the surface of the part to be acted upon, the arm is held straight, and a fine jarring or trembling movement communicated to it by an action of the flexor and extensor muscles of the upper part of the arm. This movement is difficult to produce, requiring long practice on the part of the operator, and is extremely fatiguing; but it is one of the most valuable of all the vibratory movements, as by means of it motion can be communicated to the most deeply seated parts. 302

Shaking (Fig. 56).—The part to be operated upon is grasped firmly by both hands and shaken with a rapid vibratory movement. This movement is especially applicable to the extremities and the head. 303

Digital Vibration (Fig. 57).—The end of the thumb or of one or more fingers being placed upon the part to be operated upon, the arm of the operator is thrown into violent vibra- 304

tions, which are communicated through the thumb or fingers to the patient.

305 Physiological Effects.—The special effect of vibration is that of stimulation. When applied with sufficient vigor, it is one of the most stimulating of all the procedures of massage. Deep vibration may be made to act forcibly upon the most deeply situated organs. The effect of rapid vibration is somewhat similar to that of electricity; it is capable of causing muscular contraction, even producing tetanus when applied with sufficient vigor. Very rapid vibration produces a pleasurable, tingling sensation in the parts acted upon, akin to that produced by electricity, but more agreeable, which affords sufficient evidence of the effect of this procedure upon nerve structures. Under the influence of vibratory movements, the activity of the circulation increases, the blood vessels dilate, the temperature of the part rises, and a pleasurable glow and sensation of well-being pervades the part.

306 Profound effects may be produced by the application of vibration to nerve trunks and nerve centers, as has been shown by Mortimer Granville, Charcot, and others.

307 The most pronounced effects of vibration can be obtained only by the aid of proper mechanical appliances, several of which the writer has had in use for a number of years. (Figs. 115–119).

308 Therapeutic Applications.—Vibration is useful in cases in which stimulation is required, and is only contra-indicated in cases in which there is marked hyperæsthesia, acute inflammation, febrile action, morbid growths, or some active morbid process, such as suppuration. It is valuable in most forms of paresis and paralysis. As an application to nerve trunks, it is also valuable in neuralgia and neurasthenia and in most functional nerve disorders accompanied by diminished activity.

309 Applied to the spinal column, it is of special value in sclerosis and other degenerative affections of the spinal cord, as has been well shown by Charcot. The violent trembling

of patients suffering from spinal sclerosis is often greatly relieved. Vibration of the extremities is one of the most excellent means of relieving coldness arising from spasm of the small vessels due to vasomotor disturbances, numbness, tingling, and various other morbid sensations.

PERCUSSION.

This procedure consists of blows administered in various 310 ways and with varying degrees of force. The two hands are used in alternation. The movement is always from the wrist joint, which gives to the blow the quality of elasticity. The inexperienced operator holds the wrist rigid, and pummels the patient much as a pugilist would do, thus producing disagreeable and painful effects. A dexterous and experienced operator maintains a flexibility of the wrist which adds greatly to the good effects of the treatment.

A stiff blow bruises the surface tissues without producing 311 any beneficial effect upon the deeper structures, the force of the blow being expended upon the surface. An elastic blow, executed in the manner described, penetrates deeply without injuring the superficial structures. A skilled masseur gives springy blows, the movement being almost wholly from the wrist. As a rule, the hand should strike the body transversely with relation to the muscles.

The effect of percussion is increased by placing the muscles 312 upon the stretch. This is accomplished upon the back by having the patient bend forward in a standing or sitting position, and for the abdominal muscles by having the patient raise the head without assistance while lying on the back.

The following are the principal modes of applying percussion, or *clapotement*, as this procedure is termed by the French:—

Tapping (Fig. 58).—This is a form of beating in which 313 the tips of the fingers alone are employed. Either one or all of the fingers of one or both hands may be employed. It is chiefly used for the head and the chest.

- 314** *Spatting* (Fig. 59).—This consists of percussion with the palmar surface of the extended fingers held rigid. This is the form in which percussion is most frequently employed. It is applicable to most parts of the body. It should be used before the application of other procedures when the surface is cold, or when the patient complains of chilly sensations. It is much used in connection with hydropathic applications as a means of promoting reaction.
- 315** *Clapping* (Fig. 60).—In this procedure, the whole hand is employed, the palmar surface being so shaped as to entrap the air as it comes in contact with the skin, producing a sort of explosive effect and a loud sound. It is used on fleshy parts when strong surface stimulation is desired.
- 316** *Hacking* (Fig. 61).—In this procedure the ulnar, or little-finger, border of the hand alone comes in contact with the skin. The fingers are held slightly apart, but loosely, so that they are made to come successively in contact by the force of the blow, thus giving a peculiar vibratory effect. This form of percussion is exceedingly useful. It is chiefly employed in applications to the chest, spine, and head. It may also be employed upon any other part of the body.
- 317** *Beating* (Fig. 62).—In this procedure the body is struck by the palmar surface of the half-closed fist, the dorsal surface of the terminal phalanges of the fingers and the heel of the hand alone coming in contact with the body. This mode of percussion is chiefly useful for applications to the lower part of the back and the fleshy portion of the thighs. It is a powerful means of stimulating the genito-urinary system. When applied to the sacrum, the patient stands upon the feet, bending slightly forward. Muscle beaters may be very efficiently used for beating (Fig. 136).
- 318** **Reflex Percussion.**—By this term is meant percussion movements to the so-called reflex areas, which have been fully described under the head of "Stroking." The well-known "knee-jerk" is an illustration of the effect of even so gentle a percussion as a slight tap with the finger tip in provoking

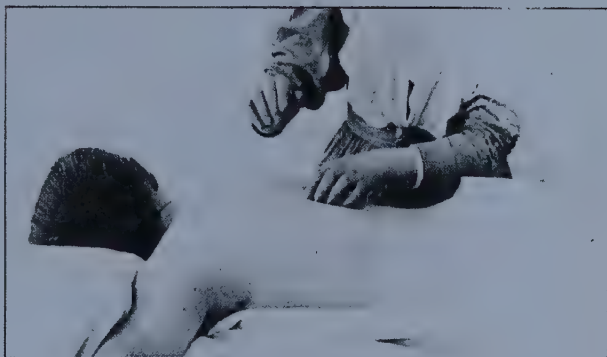


Fig. 58. Tapping.

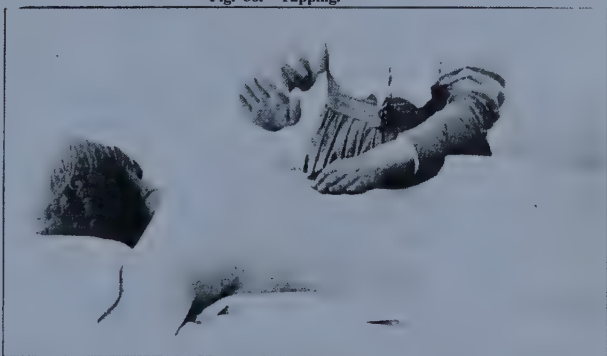


Fig. 59. Spatting.

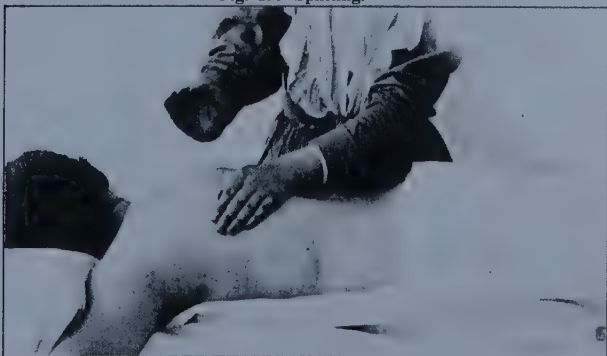


Fig. 60. Clapping.

PLATE XXV. Percussion.

reflex action, which, of course, involves the stimulation of one or more nerve centers and nerve trunks, as well as of the acting muscle or muscles. Percussion of any part of the body doubtless gives rise to reflex activities of varying degree, but the most pronounced effects necessarily follow the application of this procedure to those surfaces which are in most direct relation to definite centers in the spinal cord.

The principal reflex areas which may be named, and the proper mode of stimulation, are as follows:—

Interscapular Area.—The application is best made with the 319 patient sitting with the arms folded in front, and bending slightly forward. The masseur, standing behind, applies percussion—hacking and spatting—to the space between the scapulæ, or shoulder blades. The interscapular reflex has relation to the sixth, seventh, and eighth cervical, and first dorsal, segments of the spinal cord.

Epigastric Area.—The patient lying upon the back, tap- 320 ping, hacking, spatting, or beating movements are applied to the sides of the chest between the fourth and sixth ribs. This area is in relation to the fifth, sixth, and seventh dorsal segments.

Abdominal Area.—With the patient lying upon the back, 321 tapping, hacking, spatting, or clapping movements are applied to the sides of the abdomen in the mammary line. This application stimulates the eighth, ninth, tenth, eleventh, and twelfth dorsal segments.

Cremasteric Area.—Hacking and percussion of the inner 322 portion of the upper half of the thigh stimulates the first, second, and third lumbar segments.

Gluteal Area.—With the patient lying upon the face, hack- 323 ing, spatting, clapping, or beating movements are applied to the fleshy portions of the hips, thereby stimulating the fourth and fifth lumbar centers.

Plantar Area.—Spatting and hacking movements applied 324 to the sole of the foot stimulate the five sacral segments of the cord.

325 Tendon Reflexes.—Percussion of the tendon of a muscle, and sometimes percussion of the muscle itself, gives rise to muscular contraction. This is best illustrated in the knee in what is called the “knee-jerk,” or “patellar reflex.” With one limb crossed over the other, a light tap upon the tendon just below the patella gives rise in most persons to contraction of the quadriceps extensor, as evidenced by a movement of the foot. To be effective, it is necessary that the blow should be applied when the tendon of the muscle is tense.

The principal points at which tendon percussion may be advantageously employed, and the nerve centers which are stimulated at the several points named, are as follows:—

326 Back of the Neck.—With the patient sitting with the head flexed forward as far as possible, apply hacking movements from the *vertebra prominens* to the *occiput*, striking the muscles transversely. This application stimulates the first, second, third, and fourth cervical segments.

327 Wrist Tendons.—Grasping the patient’s hand with the palmar surface up, and extending it as far as possible, so as to render tense the tendons at the wrist, make light tapping or hacking movements across the front of the wrist. In many cases a decided muscular contraction may be noticed after each blow. Percussion at this point stimulates the fourth, fifth, sixth, seventh, and eighth cervical segments of the cord.

328 The “Knee-jerk” (Fig. 63).—The patient sits with one leg crossed over the other, so as to render tense the tendon of the extensor muscles of the thigh. Tapping the part of the tendon just below the patella with the tip of the middle finger, or applying a transverse blow with the edge of the hand, will usually give rise to strong contraction of the quadriceps and thrusting of the toe forward. In some persons this reflex may be developed with the patient lying with the limbs extended, by placing one finger just above the patella and crowding it down as far as possible, then striking the finger with the middle finger of the other hand. This reflex involves all five of the lumbar segments of the cord.

The Ankle Reflex.—With the patient lying upon his face, 329
the limbs extended, grasp the foot with one hand and forcibly
flex it upon the leg so as to render the tendon Achilles as tense
as possible. Tapping or hacking movements applied to the
stretched tendon will often give rise to contraction of the mus-
cles of the calf and extension of the foot. This application
stimulates the first, second, and third sacral segments.

The tendon reflexes are all rendered more active by divert- 330
ing the patient's attention. This may best be accomplished by
causing him to contract forcibly a muscular group in some other
part of the body than that which it is desired to operate upon.
For example, in testing the ankle and knee reflexes, the patient
may be caused to close his hands as firmly as possible; when
operating upon the wrist or the back of the neck, the patient
may be made to forcibly flex or extend his foot.

Percussion is sometimes applied by means of rubber balls 331
attached to reed or whalebone rods, or by elastic rubber tubes
attached to a handle,—the so-called “muscle beater” of
Klemm. These instruments are worthy of mention, as they
afford a means by which the patient can apply percussion
to himself (Fig. 138).

Point Percussion.—Percussion applied at the motor points 332
is sometimes a most effective means of producing muscular con-
traction, as at these points the motor nerves may be directly
stimulated by the mechanical force applied. Tapping and
hacking are the most efficient means of applying point per-
cussion. Usually the best effect will be obtained by placing
one finger upon the motor point, pressing firmly upon the
nerve, and then tapping the finger with the fingers of the
other hand.

Physiological Effects.—Percussion is a powerful ex- 333
citant, acting not only upon the skin, but upon the tissues
beneath. A short, light application produces spasm of the
superficial vessels, which may be easily demonstrated by tap-
ping a point upon the back of the hand with the finger for
a few seconds, and noting the decided pallor which results.

Strong percussion, or a prolonged application of light blows, gives rise to dilatation of the surface vessels, as evidenced by marked redness of the skin. Strong percussion may even produce paralysis of the blood vessels.

- 334** Reflex percussion is certainly a most powerful means of stimulating those nerve centers which may be brought under the influence of this special mode of application, which include, to a greater or less extent, all the segments of the cord. The lumbar and sacral portions of the cord especially may be acted upon in a powerful manner by this procedure. The therapeutic value of this special form of percussion will be recognized at once when it is remembered that the important functions of the bladder, rectum, and sexual organs are largely controlled by centers located in the lower portion of the cord.
- 335** The direct application of percussion to the spine is one of the most powerful means of stimulating the vasomotor centers and the nutritive functions of the viscera which are controlled by the splanchnics. The cervical splanchnics which emanate from that portion of the spine included between the first cervical and the fourth dorsal segments, control the circulation of the heart, stomach, and lungs; the second group of splanchnics, leaving the cord between the second dorsal and the second lumbar, controls the great vascular area of the intestines; while the third set of splanchnics, leaving the cord at the second and third sacral segments, controls the circulation and, through it, the nutrition and, to a large extent, the functions of the genital organs.
- 336** It is thus apparent that vigorous vibratory movements communicated to the spine, especially by means of hacking and beating, which act most effectively upon deep-seated structures, may be the means of powerfully influencing the functions of all the viscera of the trunk, as well as the genital organs, though the latter are partly internal and partly external.
- 337** Point percussion produces powerful motor effects, inducing vigorous contraction of the muscles to which the nerve operated upon is distributed. The results produced by point



Fig. 61. Hacking.

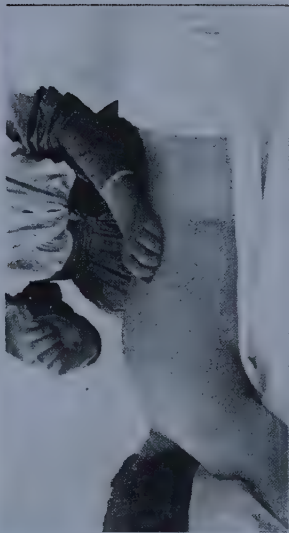


Fig. 62. Beating.

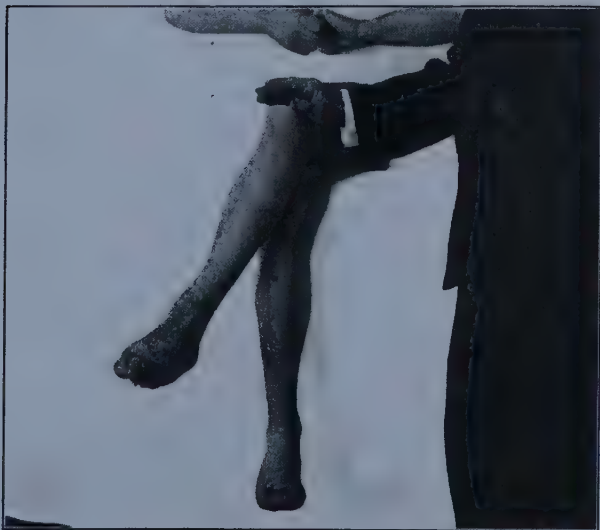


Fig. 63. Reflex Percussion (Knee-jerk).
PLATE XXVI. Percussion.

percussion are often more marked than those obtained from faradization, especially in cases in which the excitability of the muscle is modified by disease.

Therapeutic Applications.—Percussion, especially 338
spatting and clapping, is much used in connection with hydrotherapy as a means of promoting reaction after cold applications to the surface. This procedure is useful in all cases in which stimulation of the skin is desirable, either for derivative effects or for direct influence upon the skin. It is consequently useful in all cases of functional inactivity of the skin, as in jaundice.

In chronic sciatica, lumbago, and coldness of the extremities, 339
percussion has a decidedly favorable influence, as also in passive congestion of the liver and spleen, in which cases it is employed over the region of these organs. In constipation, it may be applied over the abdomen as a means of stimulating general peristaltic activity, and over the sacrum to stimulate activity of the lower bowel.

Beating the sacrum is valuable in atony of the bladder and 340
in impotence or sterility from loss of sexual vigor. The ancient Romans practiced whipping of the buttocks for relief of impotence in man and sterility in women. Vigorous spanking has sometimes been employed by libertines for the same purpose; and the writer has met one or two cases in which whipping had given rise to involuntary action of the genital organs in a boy, and one or two cases in men in which the same effect was produced by percussion of the lower portion of the back and upper thighs, thus clearly demonstrating the powerful influence of this procedure upon the centers of the cord.

Hacking of the spine is especially useful in sclerosis; and 341
hacking of the chest, in unresolved pneumonia, adhesions from chronic pleurisy, and in promoting absorption in cases of serous effusion into the pleural cavity.

JOINT MOVEMENTS.

- 342 The principal movements included under this head are : —
Flexion, extension, abduction, adduction, pronation, supination, circumduction, stretching.

Certain principles which apply to all the different forms of joint movements must first be considered before describing particularly the individual movements. The most important of these are the following : —

- 343 1. Joint movements may be either *passive* or *resistive*. In *passive* movements there is simple motion of the joint, effected wholly by the manipulator, and without any effort on the part of the patient. In passive movements, the effect is chiefly confined to the joint, involving its articular surfaces, the ligamentous bands by which the joint is supported, and the blood and lymph vessels connected with it. In *resistive* movements, not only the joint but the muscles acted upon, are involved, since both the patient and the masseur take part in the movement, the patient resisting the movements which the masseur endeavors to execute, or *vice versa*.
- 344 2. The *extent* of the *movement* in passive motion of the joint should be sufficient to produce a distinct feeling of resistance, the degree of which will indicate the extent to which the ligamentous structures of the joint are acted upon.
- 345 3. The *degree* of *resistance* employed in resistive movements should always be carefully regulated to the condition of the patient's tissues. Too great resistance is likely to leave the muscles sore, requiring several days' rest from treatment, and perhaps discouraging the patient. Slight soreness, however, may be expected at the beginning of treatment. This is due simply to the congestion of the muscle resulting from the

afflux of blood, and will be followed by improved nutrition which will terminate in an increase of strength.

4. In *resistive* movements, resistance on the part of the masseur should carefully follow the movements of the patient in flexion and extension. The ability to do this well can only be acquired by careful practice. 346

5. In case of great feebleness of the muscles, the movements must sometimes be *assistive* rather than resistive, until the patient acquires ability to lift the limb, which may sometimes be found lacking at the beginning of treatment, or until the connection between the will and the muscles, which has been at first interrupted, shall be restored. Sometimes the patient fails to contract a muscle through lack of confidence. Assistive movements made in such a manner as to give the patient the impression that the movement is effected through his own volition, will overcome this obstacle with surprising readiness. 347

Every experienced gymnast is acquainted with the fact that when a muscle is once contracted to the extent of its capacity, much greater force is required to overcome the contraction than the same muscle would have been capable of exerting in contracting against resistance. This fact may be utilized in the treatment of patients whose muscles are extremely feeble, the resistance being made by causing the patient to first flex the limb or extend it, as the case may be, and endeavor to hold it in position while the manipulator applies force to change its position.

6. In *resistive* movements either the patient or the masseur may initiate the movement. Usually the patient initiates the movement, and the operator, the instant the movement starts, begins to offer resistance, first very slight, but gradually increasing to the limit of the patient's strength, then diminishing, so as to allow the completion of the movement on the part of the patient; that is, the complete extension or flexion, abduction or adduction, supination or pronation, of the limb, as the case may be. If the muscle is very feeble, the patient 348

should completely extend, flex, abduct, adduct, supinate, or pronate the limb, before the resistance is begun, the masseur then making the attempt to execute the opposite movement, while the patient endeavors to retain the limb in the position in which it has been placed.

349 7. Patients often need to be taught how to execute a movement, especially those whose muscles have been long at rest. Sometimes the patient fails to move a limb as requested, because he contracts both the extensors and the flexors equally at the same time, producing a trembling oscillation between flexion and extension instead of a definite movement. This obstacle must be met by careful training, in which assistive movements may be at first required.

350 8. When it is desired to limit the motion to a single joint, the portion of the limb on the proximal side of the joint—that is, the side next the body—should be steadied so as to prevent motion of the next joint above, while the distal part of the limb is grasped and made to execute the movements required.

351 9. As a general rule in *resistive* movements, the *fingers pull* to resist flexion while the *heel of the hand pushes* to resist extension. The same principle applies to abduction, adduction, and other movements.

352 **Physiological Effects.**—The venous and lymph channels, especially the latter, are larger in the vicinity of the joints than in other parts of the limbs, a fact which is doubtless attributable to the great amount of absorption required to keep the articulating surfaces in perfect working order. This fact attaches very great importance to manipulations involving the joint or its immediate vicinity. On account of it, joint movements and manipulation of the joints are capable of producing very powerful derivative effects upon neighboring and more distal parts. Through the direct influence of movements and massage upon a joint, its nutrition may be modified to a very marked degree, as the result of the hyperæmia induced and the increased circulation of fluids in the blood and lymph channels. The influence of movements upon a joint is well illustrated in



Fig. 64. Passive Extension and Resistive Flexion of Wrist.

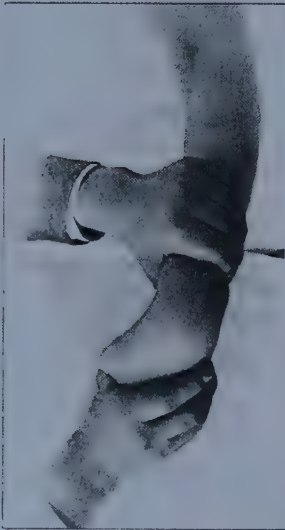


Fig. 65. Passive Flexion and Resistive Extension of Wrist.

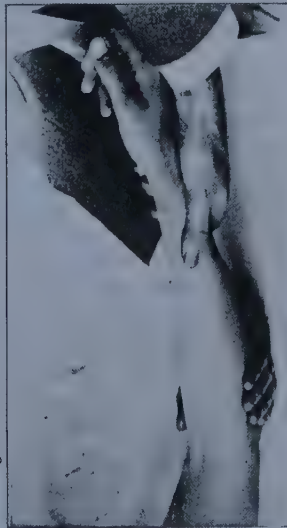


Fig. 66. Passive Pronation and Resistive Supination of Hand



Fig. 67. Passive Supination and Resistive Pronation of Hand.

the large finger joints of artisans, especially those who use the hands in heavy lifting.

Therapeutic Applications.—Joint movements are of 353 special value in the various forms of chronic joint disease in which movement is lessened, as in the stiffening which arises from rheumatism, rheumatic gout, chronic synovitis, and the treatment of fractures and sprains by complete immobilization. Joint movements, cautiously employed, may also be of use in the derivative treatment of an acute inflammatory process in a neighboring and more distal joint. It should be remarked that great care is necessary in treatment by the application of joint movements in neuroses of the joint, such as are frequently left after attacks of inflammation arising from injury or otherwise. Even the gentlest manipulations are sometimes very badly borne in these cases. Often derivative friction practiced upon the joint above and the neighboring soft tissues will alone be tolerated by these cases until after a very considerable degree of improvement in the nutrition of the parts and a lessening of the patient's general nervous irritability have been secured. It is sometimes necessary to postpone joint movements several weeks, and perhaps for two or three months. It is hence highly important that cases of this sort should be recognized at the outset, as otherwise the patient is likely to be made worse and, becoming discouraged by the treatment, give it up. Hydrotherapy and electricity are almost indispensable in the early stages of the treatment in these cases.

Flexion, Extension, Abduction, Adduction, Supination, Pronation, and Circumduction.—Practically the same principles govern the application of these several different movements. The chief points to be considered, in addition to those already presented, relate to the special mode of executing the different motions for different parts, which may be briefly described as follows:—

Flexion and Extension of the Wrist (Fig. 64).—With the 355 forearm halfway between supination and pronation, take the

patient's hand as in shaking hands, right to right or left to left. The other hand should seize the forearm just above the wrist. In this position, *passive* movements of both *flexion* and *extension* may be executed. The same position is also used for *resistive flexion*.

- 356** For *resistive extension*, the patient's forearm should be pronated and the hand of the patient grasped by the masseur with his opposite hand ; that is, left to right and right to left. The other hand should steady the arm, by grasping it just above the wrist (Fig. 65).
- 357** *Pronation and Supination of the Hand*.—For passive pronation and resistive supination (Fig. 66), the masseur grasps the wrist of the patient with his opposite hand (right to left or left to right), in such a manner that the back of the wrist and the lower ends of the bones of the forearm fall into the hollow of his hand, the thick portion of the thumb resting just behind the lower end of the radius so as to control it. The other hand is placed beneath the elbow to support the patient's arm, care being taken not to hold the bones of the forearm so tightly as to prevent their free movement.
- 358** For *passive supination* and *resistive pronation* of the hand (Fig. 67), the masseur grasps the patient's right hand with his own right, supporting the arm with his left. With the patient's arm in pronation, the hand of the masseur should grasp the forearm in such a way that the palm of his hand will rest upon the front of the wrist, the fleshy portion of the thumb falling upon the front side of the lower end of the radius.
- 359** *Flexion and Extension of the Forearm* (Fig. 68).—The masseur grasps the wrist of the patient with his corresponding hand, and with his other hand seizes the arm just above the elbow and steadies it.
- 360** The same grasp serves for either *passive* or *resistive flexion* or *extension*, and may be employed for *passive pronation* and *supination*, *abduction* and *adduction*, and *rotation* of the *humerus*. All of these movements, with the exception of resistive flexion and extension, may be accomplished in making the wrist describe a circle.

Circumduction of the Arm.—The masseur stands behind 361 the patient, fixes the shoulder with his opposite hand, and with the other seizes the arm just below the elbow, and causes the lower end of the humerus to describe as great a circle as possible without too great resistance. The peculiar formation of the shoulder joint gives the greatest resistance at the upper part of the circle.

This same grasp is a suitable one for *resisting* the action of 362 the muscles which pull the arm forward and those which draw it backward.

Circumduction may also be performed by standing in 363 front of the patient and seizing the wrist with the corresponding hand, and the elbow with the other hand (the patient sitting).

Backward movements of the arm may be resisted by taking 364 the hand of the patient with the corresponding hand, and with the other hand grasping the arm above and behind the elbow.

The *deltoid* may be resisted by placing one hand upon the 365 shoulder and the other upon the outside of the arm near the elbow. It is most convenient for the masseur to stand behind the patient.

Movements of the Ankle (Fig. 69).—The masseur should 366 sit facing the patient, who sits with leg extended. Seize the foot with the corresponding hand at the junction of the toes with the body of the foot, the thumb falling upon the sole of the foot; with the other hand grasp the leg above the ankle. This grasp is convenient for *passive* and *active flexion* and *extension*, and also *circumduction*. The pressure should be applied against the distal ends of the metacarpal bones, rather than upon the toes.

Movements of the Knee Joint (Fig. 70).—These movements 367 are usually combined with movements of the hip joint, as follows: The heel of the patient is grasped by the corresponding hand of the masseur, while the other grasps the calf of the leg. In *passive* movements the limb is simply pushed up, and allowed to return to extension by its own weight.

- 368 For *passive circumduction*, the assisting hand is placed upon the top of the knee instead of the calf, the knee being made to describe as large a circle as possible with moderate resistance.
- 369 In *resistive flexion and extension* of the *leg*, the leg and foot are grasped as in movements of the ankle. Considerable force must be used by the masseur in resisting extension, which may be done either when resting upon the knee placed upon the edge of the couch, throwing the body forward, or by standing with the back to the patient and clasping the hands across the sole of the foot beneath the instep.
- 370 *Abduction and Adduction of the Thighs* (Fig. 71).—The patient lies with the knees half flexed by drawing up the heels. *Abduction* is resisted by placing the hands against the outer side of the knees; *adduction*, by placing them against the inner surface.
- 371 *Resistive Flexion of the Thigh*.—The patient draws up the leg while the masseur makes resistance by placing the hand upon the anterior surface of the thigh, near the knee.
- 372 **Joint Stretching**.—This is a powerful means of stimulating the nutrition of a joint. Enlargement of the joint has long been noticed to be a consequence of “cracking” the fingers. Joint stretching is much practiced by the Turks in connection with the shampooing of the Turkish bath. Stretching may be applied as follows:—
- 373 *The Arm and Shoulder Joints*.—The patient lying upon the back, the head and shoulders slightly elevated and the arms extended upward, the masseur stands behind and seizes the hands of the patient in such a manner that the palmar surfaces of the hands are in contact, the thumb of the masseur passing between the thumb and the first finger of the patient, while his fingers pass around the fleshy portion of the thumb and the back of the hand of the patient. The grasp might be described by saying that the patient and masseur each grasps the other's thumbs with the corresponding hand. A series of vigorous elastic pulls are made, avoiding sudden

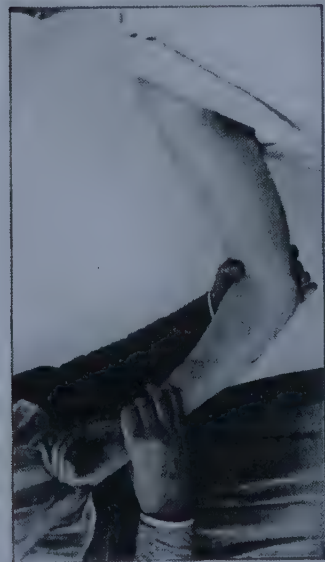


Fig. 68. Passive Flexion and Resistive Extension of Forearm.

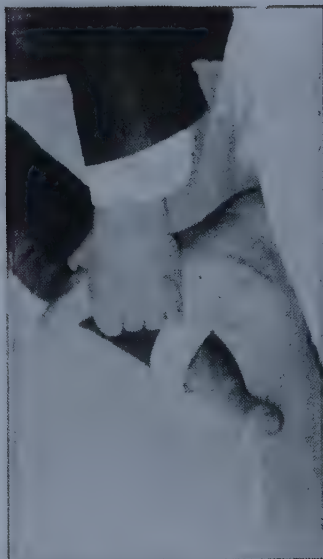


Fig. 69. Passive Flexion of Ankle.



Fig. 70. Movements of Knee and Hip Joint.

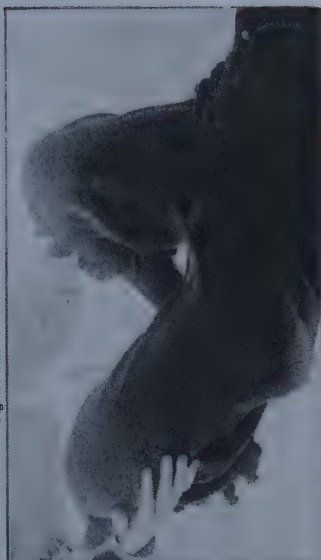


Fig. 71. Resistive Abduction of Thighs.

twitches. The application of the force applied should be gradual, the withdrawal sudden.

This movement not only acts upon the joints of the shoulders and arms by stretching them, but may be a powerful means of expanding the chest by making the patient inspire while the masseur stands in a chair behind him and resists the downward pull of his arms. As before stated, the pull should not be continuous, but should be intermittent, each strain lasting three to five seconds, the patient being allowed to take a breath during each interval.

The arm and shoulder joints may also be stretched as follows: The patient lying with the arm extended at the side, the masseur, facing the same side, grasps the patient's hand with his opposite hand, placing the other hand against the chest close to the axilla, and pulls with force graduated to the strength of the patient. 374

Stretching of the joints of the legs may be applied by seizing the foot and pulling in the line of the body. The toe joints are stretched by pulling each toe separately. 375

The Finger Joints.—Flexion, extension, and stretching movements should be applied to the finger joints especially in the treatment of cases in which these joints are stiffened by disease or by improperly treated fractures of the wrist or forearm, and in writer's cramp. 376

MASSAGE OF SPECIAL REGIONS.

In the foregoing pages has been given a careful description of the various procedures employed in massage. I will now proceed to give more specific directions for the general and local application of massage in which the various manipulations are combined.

377 General Massage.—The order of application to different parts of the body in the administration of general massage should be as follows :—

(1) Arms ; (2) Chest ; (3) Legs ; (4) Abdomen ; (5) Hips ; (6) Back ; (7) Head.

In the application of the different procedures named below, it should be understood in general that the parts are to be gone over with each manipulation from four to eight times. For specific directions respecting the application of each of the various procedures, the reader is referred to previous pages, except in the case of such movements as are especially adapted to particular regions, directions for which will be given as may be required to make their application plain.

378 Massage of the Arm.—The several procedures are applied in the following order :—

1. Friction—light centripetal (193, 199-201, 213-217).
2. Fulling (244).
3. Friction—spiral and centripetal (196).
4. Petrissage, or muscle kneading (248-254).
5. Rolling (255-260).
6. Friction—centripetal.
7. Wringing (261-264).
8. Friction—centripetal.

9. Percussion—hacking (316), spatting (314), beating (317).

10. Joint movements (343-348)—flexion, extension, rotation, stretching, etc. (355-365, 372-376).

11. Vibration—shaking (303).

12. Stroking (175, 169-172).

In masseing the arm, centripetal friction and fulling are 379 first applied to the whole arm, beginning with the hand, as preliminary treatment. Friction and deep kneading are then alternately applied in sections, first to the hand, then the forearm, then the upper arm. Procedures 5, 6, 7, 8, 9, 11, and 12 are applied to the entire arm; joint movements (10) are applied in succession to the fingers, wrist, elbow, and shoulder; rolling, wringing, and stroking, from above downward; friction, from below upward; percussion, both from above downward and below upward. Shaking, or vibration, may be applied simultaneously with stretching.

Massage of the Chest.—Order of movements:— 380

1. Friction—centripetal (very light) (203, 222).

2. Fulling (carefully) (244).

3. Friction.

4. Palmar kneading (266).

5. Percussion—tapping (313), hacking (316), spatting (314), beating (317), clapping (for very fleshy persons only) (315).

6. Assistive and resistive respiratory movements (381-384).

To *assist expiration*, compress the sides of the chest during expiration, or raise the arms outward and upward with inspiration. 381

To *resist inspiration*, place one hand upon the abdomen, causing the patient to lift it upward by the inspiratory movement, making at the same time a degree of pressure adapted to the patient's condition; or a shot-bag may be used instead of the hand (Fig. 72). 382

- 383** To *resist expiration*, have the patient breathe through a small tube (Fig. 72) or through a small opening in the lips.
- 384** In massage of the chest, great care should be observed that the patient breathes properly. The patient should be taught the proper mode of chest and waist expansion in breathing (Fig. 73). Few women know how to expand the lower part of the chest. Patients should be made to inspire through the nose, and to take deep and slow respirations.
- 385** **Massage of the Leg.**—The order of movements is essentially the same as for the arm, as follows:—
1. Friction—centripetal (**193, 202**).
 2. Fulling (**244**).
 3. Friction—spiral (**196**), circular (**195**), centripetal (**219-221**).
 4. Petrissage, or muscle kneading (**248-254**).
 5. Rolling (**255-260**).
 6. Friction—centripetal.
 7. Wringing (**261-264**).
 8. Friction.
 9. Percussion—hacking (**316**), spitting (**314**), beating (**317**), clapping (**315**).
 10. Joint movements (**343-348**)—flexion, extension, abduction, adduction, circumduction, stretching (**366-372**).
 11. Shaking (**303**).
 12. Stroking (**175, 169-172**).
- 386** Movements 1 and 2 are preparatory ; 3 and 4 are applied successively to the feet, lower leg, and thigh ; 5, 6, 7, and 8 are applied in succession to the leg and thigh in connection with 3 and 4 ; 10 is applied successively to the toes, ankle, knee, and thigh ; 9, 11, and 12 are applied to the whole leg.
- 387** The principles laid down in relation to massage of the arm apply equally to the leg.
- 388** The muscular structures of the thigh are so massive in adults, and especially in very fleshy persons, that they cannot be so conveniently grasped as in the arm and lower leg, hence it is impossible to so perfectly individualize muscles and

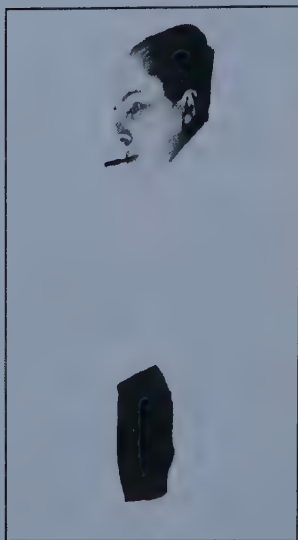


Fig. 72. Resistive Expiration and Inspiration (Using the Author's Expiration Tube).



Fig. 73. Full Breathing (Preliminary to Abdominal Massage).



Fig. 74. Inspiratory Lifting of Abdominal Contents.

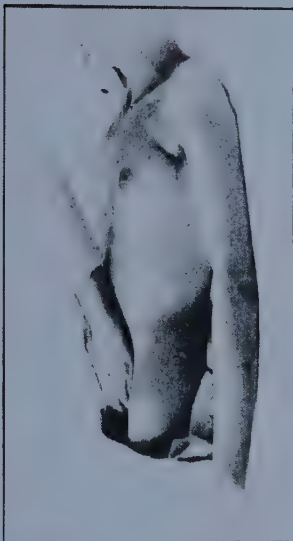


Fig. 75. Lifting Viscera.

muscular groups in the manipulation. Rolling movements must, to a considerable extent, be substituted for petrissage. Special pains must be taken, however, to follow the general contour of the bones, so as to lift and stretch every muscle, working especially over the course of the great vessels which lie along the inner border of the extensors, and taking care to pull and stretch the muscular masses away from them on each side.

Massage of the Abdomen.—Order of movements:— 389

1. Preliminary movements—deep breathing (441, 461); inspiratory lifting (444, 445); lifting the abdominal contents (442).

2. Reflex stroking (395).

3. Nerve compression (160, 396, 397).

4. Vibration—deep vibration, lateral shaking, circular shaking (398-400).

5. Percussion—tapping (313), spitting (314), hacking (316), beating (317), clapping (315).

6. Deep kneading—digital kneading of the colon (404, 405); kneading of the colon with the fist (406-408); kneading of the colon with the fingers and heel of the hand (412-414); kneading of the colon with the thumbs (409, 410).

7. Mass kneading of the abdominal contents (411).

8. Rolling (415).

9. Fulling (carefully) (420).

10. Petrissage, or muscle kneading (421, 422).

11. Stroking (175, 170).

12. Percussion of lumbar spine and sacrum (315-317).

13. Hips-raising and knees-separating exercises (481, 482).

The twelfth step may be omitted when massage of the abdomen is employed in connection with general massage, as it is included in massage of the back (426), and also the knees-separating exercise (13), which is included in joint movements of the legs (385 (10), 366-371).

The following rules should be carefully observed in abdominal massage:— 390

1. General abdominal massage should not be administered until two hours after eating.

2. The bladder should always be emptied just before abdominal massage.

3. In obstinate cases of fæcal accumulation, a coloclyster (large enema taken in right Sims's, or knee-chest, position) of warm water should be administered, the water being allowed to pass off before treatment.

4. The patient should be taught to relax the abdominal muscles, and to breathe deeply and regularly during treatment.

5. If the abdomen is very sensitive, apply a hot fomentation before giving the massage.

6. If the skin perspires very freely, render it firm and smooth by sponging with cold water.

7. Very "ticklish" patients require careful education by avoidance at first of superficial movements.

8. Pain and coldness of the extremities, or depression, after abdominal massage, is due either to bungling or violent treatment, or to extreme hyperæsthesia of the abdominal sympathetic. In such cases, employ fomentations and the moist abdominal bandage in connection with massage.

9. It is important in all manipulations of the abdomen to exercise great care not to excite pain. All movements should be executed in such a manner as to avoid sudden thrusts, thereby causing the patient pain or other disagreeable sensations, as such disturbances create rigidity of the abdominal muscles, thus seriously interfering with the effects of the manipulations.

10. In applying massage to the abdomen, the operator should stand over the patient, so as to aid his hands, as far as possible, by the weight of his body, taking care, of course, to graduate the pressure to the requirements of each individual case.

11. All deep-kneading movements in massage of the abdomen should be slower than for other parts of the body, to allow time for movement of the fæcal mass.

Therapeutic Applications.—Abdominal massage is so important a therapeutic procedure, and is so much employed as a special measure of treatment, that the subject is worthy of further consideration and a more particular description of the several procedures enumerated, and of the conditions in which each is useful. Abdominal massage is useful for the following purposes :—

1. To relieve chronic constipation.
 2. To aid stomach, intestinal, and liver digestion.
 3. To promote the absorption of fluids and elimination by the kidneys in ascites and in cases of deficient renal action.
 4. For the removal of abnormal deposits of fat.
 5. To develop weak or relaxed muscles.
 6. For the replacement of displaced viscera in enteroptosis.
- The stomach, general intestinal mass, colon, one or both kidneys, spleen, and liver when prolapsed may usually be replaced by proper manipulations.

7. Abdominal massage is a necessary accessory in the treatment of many forms of pelvic disease. Indeed, in most of these cases the primary seat of the disorder is the abdomen rather than the pelvis.

The most common and important use of abdominal massage is as a means of relieving chronic intestinal inactivity. The general causes of constipation, as regards conditions of the bowels which may be relieved by massage, are the following:—

1. Relaxed abdominal muscles, resulting in prolapse of the bowels and other viscera, and consequent stasis of the intestinal contents, with resulting dilatation of the colon. The dilatation may exist either in the cæcum or the sigmoid flexure, or the entire colon may be affected. In consequence of delay to evacuate the bowels, the fæcal contents often form hard masses, as the result of the excessive absorption of fluid due to their prolonged sojourn in the colon.

2. Deficient production of bile, due to an inactive state of the liver, either as a result of inactivity in the portal circulation, or that condition of the liver termed by the French “hepa-

tism," in which there is some local functional derangement. This condition, commonly spoken of in this country as "torpidity" or "biliousness," is one in which the liver fails to perform its work effectively in destroying ptomaines which are received in the food or are formed in the alimentary canal, or to convert into less toxic forms the leucomaines, or tissue poisons, normally developed in the system and prepared by the liver for elimination by the kidneys. This condition is commonly present in rheumatism, gout, and the various conditions included under the term "uric acid diathesis."

3. Deficient activity in the nerve elements supplying the intestines and controlling the reflexes by which peristalsis is maintained, the contents of the bowels moved along the intestine, and the normal diurnal rhythm maintained whereby the residuum reaching the lower part of the colon is regularly discharged from the body.

393 The immediate indications in relation to the removal of these causes, so far as massage is effective to accomplish it, may be enumerated as follows:—

1. Increase of glandular activity by an increase of the activity of the blood current in the portal vein, and stimulation of the abdominal sympathetic ganglia, the splanchnics, and Meissner's and Auerbach's plexuses, the nerve mechanisms which control the motor, vascular, and secretory functions of the intestines.

2. Increase of peristaltic activity through a stimulation of the nervous reflexes by which this activity is maintained, and by an increased outflow of bile from the liver, the natural laxative by which rhythmical peristaltic activity is promoted.

3. Relief of passive congestion of the portal system and of the viscera under the influence of this branch of the circulatory system, especially the liver, spleen, stomach, and intestines, thus aiding the return of these structures to a normal state and a consequent restoration of their functions.

4. Mechanical dislodgment of the contents of the colon.

5. Development of the abdominal muscles, thereby increasing intra-abdominal tension, which favors expulsion of the intestinal contents.

6. Replacement of displaced viscera.

Not infrequently — in the majority of cases, in fact — all of these indications are found coincidently present.

The procedures offered by massage by which these indications are best met, are the following : —

1. *To stimulate the nervous reflexes, and hence the peristaltic, glandular, and vascular activities, under control of the abdominal sympathetic.* 394

This may be accomplished by employing the following measures : — 395

(1) *Reflex Stroking*.— With the ends of the fingers, make very light strokes in a circular or semicircular direction about the umbilicus. Begin very close to that point, gradually extending outward, then return and repeat. Also make vertical strokes along the sides in the mammary line, and parallel with the rectus muscle. Strokes may also be made over the fourth, fifth, and sixth ribs at the sides of the chest. In sensitive persons, one-sided contraction of the abdominal muscles or a twitching at the epigastrium will be noticed as the result of the so-called abdominal and epigastric reflexes. This procedure is strongly exciting ; some patients are not able to endure it. The profound reflex effect produced in patients who are very sensitive, or “ ticklish,” is evidence of the strong influence of this procedure upon reflex nervous activity.

(2) *Nerve Compression* (Figs. 35, 76).— The stomach and the intestines are directly controlled by the *solar plexus* and the *lumbar ganglia* of the sympathetic. The solar plexus is at the epigastrium, just below the lower end of the sternum. The chief lumbar ganglia are situated on each side of the umbilicus, about two inches from it. Pressure upon these ganglia has a marked stimulating effect, because they send out energetic nerve impulses into the parts which they supply, which include not only the stomach and the intestines but all the abdominal viscera. 396

It should be remembered that these nerve masses lie beneath the abdominal contents, resting upon the bodies of the vertebræ. It is hence necessary to make a considerable degree of pressure in order to reach them. The tips of the fingers, being placed upon the points indicated, should be carried directly back toward the spinal column, the patient in the meantime being directed to take first a full breath and then to exhale as completely as possible. This diverts the mind of the patient from the procedure which is being executed, and also diminishes the abdominal tension, thus making it less difficult to bring pressure to bear upon the posterior wall of the abdominal cavity.

With patients who are extremely fleshy, and in cases in which the abdomen is greatly distended with gas, this procedure can be executed only in a very imperfect manner.

397 The position of the patient is a matter of great importance. The shoulders should be slightly raised and the knees well drawn up, the legs being supported, so that the anterior abdominal wall shall be relaxed as much as possible. The patient's hands should be by his side, and all the muscles of the body in a state of rest. Only gentle pressure should be employed, and the application should be continued only two or three seconds at each point. In many cases it will be found that extreme sensitiveness exists at the points indicated, which is evidence of an excited or hyperæsthetic state of the abdominal sympathetic. Continuous gentle pressure may be beneficial, even in these cases, however, acting as in other cases of abnormal nerve sensibility, as chronic sciatica, by setting up a series of vital activities which result in the restoration of the nerve to its normal condition.

398 (3) *Vibration*.—(a) Strong vibration applied to the abdominal contents has been shown to be one of the most powerful means of stimulating the nervous reflexes, circulation, glandular activity, and peristalsis, which can be employed for this part of the body. Either one or both hands may be used. The flat palm of the hand is applied to the surface, with the arm extended, and fine vibratory movements are executed in such

a manner as to throw the whole abdominal contents into vibration. The same movement, which consists of a sort of trembling, as elsewhere described, may be beneficially applied to the liver (Fig. 55).

(b) A more vigorous shaking movement is communicated 399 to the abdominal contents by making intermittent pressure either with one hand, or with one hand reinforced by the other, or by both hands in alternation, the movements being made with sufficient rapidity to produce a decided motion of the abdominal contents. The effect of this procedure is very marked in cases in which the abdominal walls are considerably relaxed.

(c) A third method of applying shaking is by placing the 400 palm of the hand upon the abdomen, the arm slightly flexed, then making a rapid rotary movement without allowing the hand to slide upon the surface. The direction of the movements is alternated, half a dozen in one direction and then an equal number in the opposite direction.

(4) *Percussion*.—This is unquestionably the most powerful 401 of all the stimulating means which can be applied to the viscera through the abdominal wall. All the different modes of percussion, viz., tapping, spitting, clapping, hacking, and beating, may be usefully employed. The mode of executing these movements has been elsewhere indicated.

2. *To produce mechanical effects by means of which stasis 402 of the intestinal contents may be overcome and accumulated fecal matter dislodged at the same time that the circulatory and glandular activities are stimulated.*

For this purpose deep kneading is especially to be recom- 403 mended. This may be accomplished by a number of different procedures:—

(1) *Digital Kneading* (Fig. 77).—Standing face to the 404 patient's feet, and with the fingers very slightly flexed, place the finger tips, the hand being reinforced by the other hand placed above it, upon the abdomen, low down upon the right side. Crowd the finger ends backward, pressing with as much

force as possible without giving the patient much inconvenience, against the cæcum. Carry the hand upward in the direction of the ascending colon as far as permitted by the ribs. Repeat the movement four or five times. Execute similar movements on the left side, beginning above instead of below, pressing the fingers upon the abdominal wall at a point close under the ribs on the left side. Carry the hand downward, turning toward the median line at the conclusion of the movement, so as to follow as closely as possible the course of the sigmoid flexure of the colon.

- 405 In cases in which it is believed that a considerable amount of fæcal matter exists in the colon, the procedure should be somewhat different. It should begin with the left instead of the right side, and instead of placing the hand at the start close under the ribs, it should be pressed down at a point two or three inches above the point at which the movement terminates. After two or three movements starting at this point, the hands should be carried a little farther upward, the strokes repeated as before, and the hand carried at each stroke down to the lowermost point which can be reached.

After doing the left side in this manner, execute the same movements upon the right side, beginning at a point just below the ribs instead of at the lower end of the cæcum, and gradually increasing the length of the stroke from below upward until the lower end of the cæcum is reached. The above movements may be advantageously repeated with the patient lying in the right or left Sims position, the left side for the ascending colon, and the right side for the descending colon.

- 406 (2) *Kneading with the Closed Fist* (Fig. 78).—With the closed fists used in alternation, work along the whole course of the colon, beginning at the lower end of the cæcum, directing the movements upward to the lower border of the ribs on the right side, following the oblique border of the ribs to a point midway between the umbilicus and the sternum, at which the median line is crossed; then down on the opposite side, end-

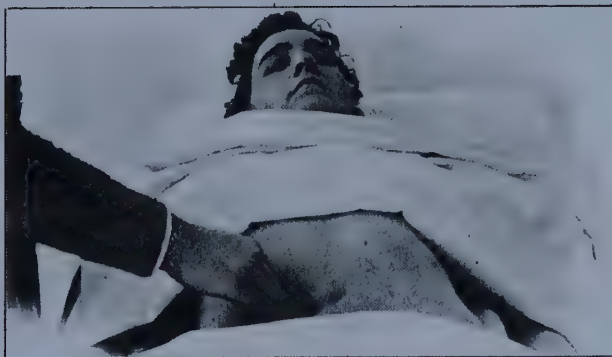


Fig. 76. Compression of Lumbar Ganglia of the Sympathetic

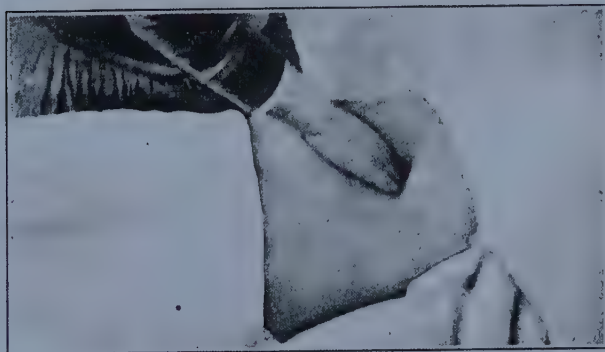


Fig. 77. Digital Kneading of the Colon

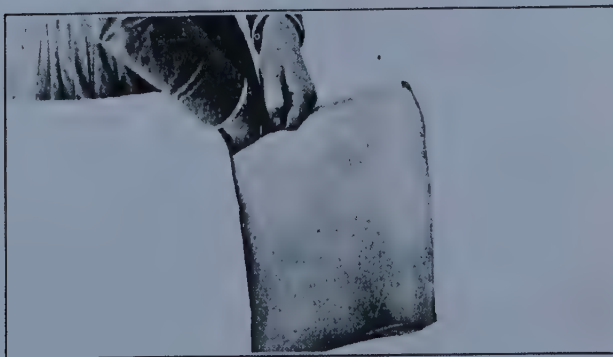


Fig. 78. Fist Kneading of Colon
PLATE XXX. Abdominal Massage

ing at a point close to the pubic bone, and just to the left of the median line.

It should be remembered that the colon lies much deeper at the sigmoid flexure than at any other portion of its course, so that in order to reach the lower part of the colon it is necessary to press the hand in as deep as possible without giving the patient too much inconvenience. The movements must be directed with great care and deliberation.

The *rate of movement* should not be more than thirty per minute, or two seconds for each hand. Care should be taken not to release the pressure upon the bowels with one hand until the other hand has been placed in position just in advance and close to it. Care must also be taken to follow the curves of the colon. 407

In the directions given above, the colon is supposed to be in normal position. This is by no means always the case, however. In the majority of women who have worn the ordinary dress, and in nearly all elderly women, the colon will be found more or less prolapsed. The prolapse usually involves chiefly the central portion of the colon, as this portion is more easily displaced than the points of junction of the ascending and descending colon with the transverse portion. The case shown in Fig. 95, a photograph of which was sent to the writer by Professor Meinert, of Dresden, Germany, will give a good idea of the unnatural conditions often found in these cases. Many cases equally bad have been encountered by the writer. A fairly correct idea of the location of the colon may be obtained by noticing the contour of the abdomen when the patient is placed in a sitting or standing position. The colon may be considered as lying along the line of greatest prominence. This may be observed with the patient standing or sitting, and marked with a soft sketching pencil or a bit of cotton moistened with tincture of iodine. 408

(3) *Kneading with the Thumbs* (Fig. 79).—With the fingers behind and the thumbs in front, grasp the loin on each 409

side between the thumb and the fingers. The right hand should thus grasp the lower end of the cæcum, while the left hand grasps the upper part of the descending colon just beneath the ribs. Movements are then executed in an upward direction with the right hand, and a downward direction with the left hand, the operator facing the patient's feet.

410 In thin persons the ascending and the descending colon can be more efficiently manipulated in this way than in almost any other, as at least some portion of the intestine may by this procedure be actually seized between the fingers and the thumb, and the contents forced along. When the colon is loaded with fæcal matter, thumb kneading, as well as fist and palmar kneading, should begin near the ribs on the right side, and as low down as possible on the left side, working gradually downward and upward respectively, in such a manner as to clear the way.

411 (4) *Mass Kneading* (Fig. 80).—Still another procedure which is of value in abdominal massage, is what may be termed “mass kneading,” in which the operator endeavors to seize the abdominal contents with both hands, manipulating them precisely as a baker does a mass of dough, the fingers of one hand being used in opposition to the heel of the other hand, and the abdominal contents kneaded and manipulated between the two hands. In this procedure the heel of one hand of the manipulator operates upon the side of the patient nearest him, while the fingers of the other hand operate upon the tissues of the opposite side. Mass kneading is only applicable to cases in which the abdominal walls are considerably relaxed.

412 (5) *Palmar Kneading*.—Two movements, both of great value, may be executed with the heel of the hand, as follows:—

413 (a) Describe a circle about the umbilicus, the hands being used in alternation, the heel of one hand moving up on the right side, and the other moving down on the left side, the stroke on the left side being made to slightly overlap that of the right side. This acts especially upon the small intestines.

(6) Starting at the lower end of the ascending colon, work 414 the whole colon with the heel of the hand, carefully following its direction from the cæcum to the sigmoid flexure, one hand assisting the other by supporting the tissues to prevent overstretching the skin. Or, knead the ascending colon with the heel of the hand, the transverse colon with the ulnar side of the hand, and the descending colon with the tips of the fingers. This method obviates the necessity of changing the position of the body during manipulation.

(6) *Rolling*.—When the abdominal walls are considerably 415 relaxed, they may be gathered between the hands placed parallel with the body, one on each side, and thus compressed, rolled, and shaken, together with the intestinal contents. Care must be taken to include the abdominal contents—not simply the skin and subcutaneous tissue or a mass of subcutaneous fat. The patient's position must be such as to secure very thorough relaxation of the abdominal muscles in order to make this procedure effective.

(7) *Massage of the Gall Bladder*.—The movement of the 416 bile from the liver toward the intestine may be assisted, and the liver be gently manipulated, by applying pressure with the left hand as follows: The operator, standing by the left side of the patient, places the left hand at the lowermost border of the ribs of the right side; a stroking movement is then executed along the lower border of the ribs of the right side in the direction of the epigastrium, the fingers being crowded up under the ribs as high as possible or until the lower border of the liver is felt. In this way it is possible to reach the gall bladder, and to facilitate the discharge of its contents into the intestine. The bile being a natural laxative, this is one of the most effective means of stimulating peristaltic activity.

Care should be taken to place the patient in such a posi- 417 tion as to completely relax the abdominal muscles, and he must be made to take long, deep inspirations during the procedure, so as to prevent, so far as possible, spasm of the abdominal muscles.

418 3. *To Strengthen the Abdominal Muscles.*

Massage alone is not sufficient as a means of developing the abdominal muscles, as is the case with all muscular structures. They must be brought into voluntary action by proper gymnastics, for which the Swedish gymnastics and the manual Swedish movements, or medical gymnastics, afford the most effective means. The application of electricity, particularly of the sinusoidal current, is the most efficient of all modes of passive exercise. This current, used with slow alternations, brings the muscles of the abdomen into vigorous contraction without producing pain or other sensation than that of motion. Much, however, can be accomplished by massage. The following procedures are the most effective:—

419 (1) *Kneading*.—As with other muscular structures, kneading is the most effective of the procedures afforded by massage, for stimulating development of the abdominal muscles. Both superficial kneading, or fulling (244), and deep kneading, or petrissage (248-254), may be employed.

420 (a) Apply fulling movements to the whole abdominal surface, working up and down in the direction of the recti muscles, and in circles about the umbilicus.

421 (b) In deep kneading, or petrissage, of the abdominal muscles, care should be taken, as in other regions, to include the individual muscles or groups of muscles in the grasp of the hand, as far as possible. The *recti* and the *external oblique* are the only muscles readily accessible to the hand. The outline of these muscles may be easily discerned by causing the patient to raise the head by forcible effort, and without the assistance of the arms. Forcible contraction of the recti muscles causes the external oblique to bulge at the sides, showing the outline of both sets of muscles. When the abdominal muscles are thoroughly relaxed by proper position, and in cases in which they are especially in need of this form of treatment, the recti muscles can be quite easily grasped and manipulated individually. The external oblique is less easily managed, but by a

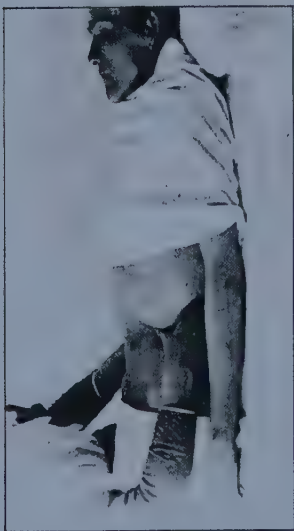


Fig. 79. Thumb Kneading of the Colon.



Fig. 80. Mass Kneading



Fig. 81. Kneading of the Abdominal Muscles.

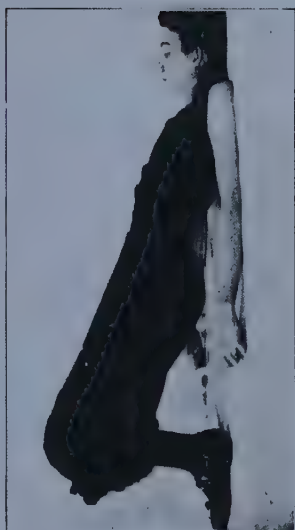


Fig. 82. Raising Hips.

painstaking effort the whole muscle can be subjected to a thorough manipulation.

A very effective mode of masseing the recti muscles is to cause the patient to raise the head (Fig. 81); then, with both hands placed upon the abdomen in such a manner that the thumbs rest upon the recti, the operator facing the patient, the muscles are rapidly manipulated by the thumbs, working from below upward.

In some patients these manipulations are apt to produce excoriations of the skin in consequence of its thinness. This is especially the case when the skin becomes moist by perspiration. To obviate this difficulty, the surface should be well lubricated with cacao butter or talcum powder.

Replacement of the Abdominal Viscera.—This is necessary in many cases of abdominal massage, as a preliminary procedure. It is especially required in women, since in the majority of invalid women some of the viscera are almost certain to be found displaced. The stomach is displaced from two to five inches below its normal position in nineteen out of twenty of all adult civilized women who have worn the conventional dress. A movable, or floating, right kidney is to be found in at least twenty-five per cent of women who are likely to require abdominal massage. The liver is also not infrequently found displaced. The methods employed in replacing the various viscera are given elsewhere (439-450).

Massage of the Hips.—With the patient lying upon the back, the manipulations are applied to the fleshy portions of the hips, or the buttocks, the several procedures being administered in the following order:—

1. Light centripetal friction (193).
2. Fulling (244).
3. Circular friction
4. Petrissage (248).
5. Palmar kneading (266).
6. Centripetal friction.

7. Nerve compression along the sacro-iliac synchondrosis (junction of sacrum with iliac bones) and over the sciatic nerve (Fig. 35).

8. Percussion — hacking (316), spatting (314), beating (317), clapping (315).

9. Stroking (175).

426 Massage of the Back.— The patient lies upon the face, the forehead resting upon the crossed hands, the elbows well raised from the sides so as to spread the scapulæ and uncover as much of the back as possible:—

1. Centripetal friction (193).

2. Fulling of the neck, shoulders, sides, and loins (244).

3. Friction — circular (195), centripetal (193).

4. Deep kneading — palmar kneading, or rolling, above the scapulæ (Fig. 53); digital kneading, following the ribs (292); palm kneading up and down the spine (288, 291, 294); digital kneading of the spine (Fig. 54) (287, 289, 290, 293).

5. Nerve compression (156); spine stretching (427).

6. Percussion of spine and sacrum — tapping, hacking, slapping, beating, clapping (313-317).

7. Friction (alternating with kneading, as above) (228).

8. Stroking (175, 170).

427 *Spine stretching* may be applied in one of the following ways:—

1. Suspension by the head or the head and shoulders. By means of an improved form of apparatus which the writer has had constructed, and has used for several years, the tension upon the head and shoulders may be separately determined and proportioned with accuracy.

2. The patient lying upon his face, hips and chest supported by pillows, his head is strongly flexed by the masseur over the end of the couch.

3. The patient sitting with legs extended horizontally, leans forward while the attendant flexes his head strongly forward.

428 Massage of the back is a very agreeable procedure for most patients. The skin of the back is but little sensitive,

and will bear the employment of considerable force. Percussion of the spine is one of the most powerful means of affecting the deep-lying nerve centers, and affects not only the spinal centers but, reflexly, the sympathetic centers also, and through the splanchnics, influences the circulation in the stomach and intestines. Pain in the spine is most often due to hyperæsthesia of the abdominal sympathetic, but is often due to anæmia which may be present, or the result of spasm of the vasomotor centers, having its origin in sympathetic irritation. The pain usually disappears under treatment when the force employed is graduated with sufficient care. Fomentations applied daily and the moist, or so-called heating, compress worn at night are necessary adjuncts to massage in cases in which there is much tenderness of the sympathetic. Pain in the sacral region may be due to rectal, ovarian, or bladder disease. Pain in the lumbar region is usually due to hyperæsthesia of the abdominal sympathetic. Pain in the dorsal region originates in irritation of the solar plexus.

Massage of the Head.—Massage of the head and neck 429 29 is not usually included in general massage, but may often be advantageously added to the general manipulations as a means of quieting any slight excitement which may have been produced, and leaving the patient in a restful state. Head massage is especially valuable for the relief of headache, neurasthenic pains, baldness, the dullness and other uncomfortable sensations resulting from loss of sleep, cerebral anæmia, neuralgia, and migraine.

The procedures which I have found most useful are the 430 30 following, usually employed in the order given :—

1. Digital kneading, from forehead to occiput (Fig. 83) (268).
2. Hacking (316), from before backward.
3. Chucking (Fig. 45), one hand placed upon the forehead or the side of the head, the other opposite.
4. Tapping (313).
5. Hacking.

6. Head rolling, flexion, and twisting, both active and passive, repeated four to eight times.

7. Stroking from vertex to base of skull, down back of neck, and along the submaxillary groove.

8. Vibration — shaking (303).

9. Pressure.

10. Hypnotic stroking (189).

431 In cases of great immobility of the scalp (a "hidebound" condition), when necessary, a better hold of the scalp may be obtained by grasping the hair between the fingers close to the roots. Care should be taken, however, not to give so great latitude to the movements as to produce unpleasant sensations from pulling the hair.

432 **Neck Massage.**—The purpose of neck massage is to withdraw blood from the brain. The circulation in the brain is so directly affected by the breathing movements that it is especially important that respiration should receive attention. The patient should sit with the head well raised, the arms extended downward as far as possible, so as to expose the neck to the fullest extent, and should be made to execute deep breathing movements for a few times before the manipulations are begun, so as to insure full respiration, and to distract his attention from the manipulations. The strokes should be made at the same time with inspiration, and with both hands simultaneously, except in cases in which the throat is so sensitive that irritation of the larynx and coughing result from compression of the larynx between the fingers or thumbs of the two hands, when the strokes should be made in alternation.

433 *Höffinger's Method.*—Massage of the neck may be applied in several ways. The following is known as Hoffinger's method (Fig. 84): The patient sits upon a high seat, the operator standing behind. The hands are brought in contact with the neck in such a way that the little fingers fall into the groove beneath the jaw. The hands are then made to move downward, the arms rotating inward at the same time, the ends of the fingers pressing upon the jugular veins. After a few



Fig. 83. Digital Kneading of the Head.



Fig. 84. Neck Massage, Hoffinger's Method.

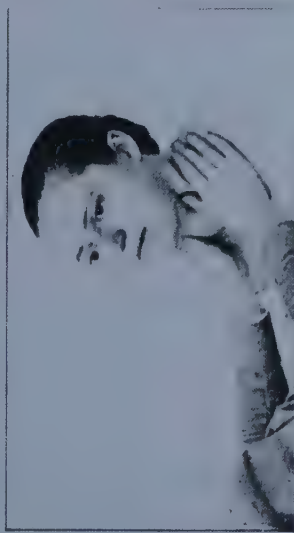


Fig. 85. Neck Massage, Gerster's Method.



Fig. 86. Neck Massage (in Children).

strokes over the anterior portion of the neck, similar strokes are made with the thumbs over the back part of the neck. The deep breathing should be continued during the manipulation.

Höffinger employs only manipulations of the anterior portion and sides of the neck. Experience has led me to employ also manipulation of the back part of the neck, extending from the occiput down on either side of the ligamentum nuchæ to the vertebra prominens. This manipulation powerfully influences the cervical sympathetic, and is of very great value in cases of occipital headache and the "neckache" so common with neurasthenics.

Gerster's Method. — Massage of the neck may also be applied from the front—Gerster's method (Fig. 85). With the fingers extended and held close together, the palm upward, the little fingers are applied to the neck just below the ears. The hands are then moved downward and rotated inward, so that the tips of the thumbs fall on each side of the larynx. Friction is thus applied in such a manner that the fingers compress and empty the external veins, while the thumbs press upon the internal jugular veins.

In the case of children or persons with very small necks, the thumb may manipulate the front part of the neck while the fingers are applied to the back of it (Fig. 86).

Author's Method. — I employ hacking and fulling, as well as friction, and direct my manipulators to apply the following procedures in the order given:—

1. Gentle fulling of the skin of the neck (244).
2. Friction of the anterior portion of the neck (433 or 435).
3. Friction of the back of the neck (434).
4. Percussion—gentle tapping (313) and hacking (316) of the back of the neck from occiput to vertebra prominens.
5. Stroking from the forehead backward and down the back of the neck, and from the vertex downward and over the anterior portion of the neck.

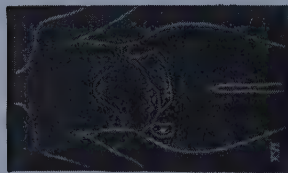
438 Neck massage is an extremely useful procedure for the relief of insomnia and cerebral congestion, and is often effective in cases of migraine and other forms of headache. Some cases have been reported in which non-cystic enlargement of the thyroid gland has been improved by neck massage.

439 **Replacement of the Abdominal Viscera.**—Glenard, of France, first called attention to the great mischief arising from the condition which he terms *enteroptosis*, or prolapse of the viscera of the abdomen. A careful study of the subject for the last ten years has convinced the writer that displacements of the stomach, colon, kidneys, spleen, and liver are responsible for a much greater number of symptoms than is generally supposed, and is the real cause of suffering in a large proportion of cases, especially in women, which have been treated with little or no benefit for supposed disorders of the pelvis. The accompanying cuts (Figs. [1] to [11]) illustrate a few of the many cases of visceral prolapse which have come under the writer's observation within the last ten years. Fig. [1] represents a case in which the right kidney had become so diseased in consequence of its prolapsed condition that its removal by a surgical operation was necessary. In operating for its removal, it was found to contain a calculus weighing more than four ounces. This was a case in which massage would have been unavailing; but it would have been a measure of great value, had it been employed a few years earlier.

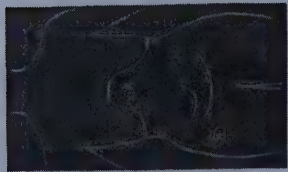
Figs. 87 to 95 illustrate the causes of visceral prolapse, and will suggest the means necessary to aid recovery in these cases, and the advantages which may be derived from massage. Gastric neurasthenia certainly owes many of its distressing symptoms to disturbance of the abdominal sympathetic resulting from displacements of the sort referred to. I have found the following the most effective means of replacing the abdominal contents, as a whole, and restoring the viscera to their normal position :—



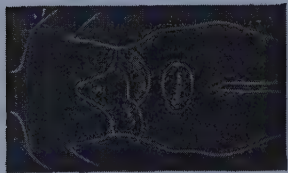
(1) Visceral Displacement from Incorrect Standing and Corset Wearing



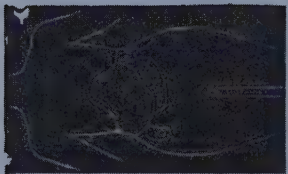
(2) Displaced Viscera.



(3) Results of corset constriction (Woman of 30).



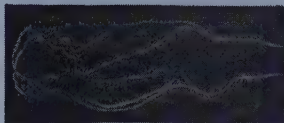
(4) Displacement of spleen and other Viscera from corset Wearing.



(5) Woman Who had Worn a "Health Corset."



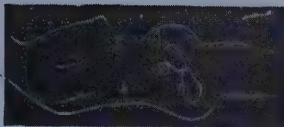
(6) Bad Standing Corrected (Man).



(7) Bad Standing Corrected (Woman).



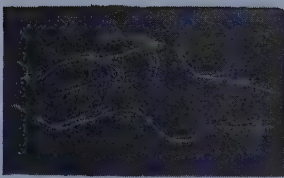
(8) Standing on one Foot Corrected



(9) Results of corset constriction in a young woman of 30.



(10) Displacement of Spleen and Other Viscera from Corset Wear-



(11) Woman Who had Worn a "Health Corset."

PLATE XXXIII.—Visceral Displacement.



Fig. 87. Venus de Milo.



Fig. 88. A Women of Fashion.



Fig. 89. Internal view of a Healthy Figure.



Fig. 90. Corset deformed Figure, Internal View

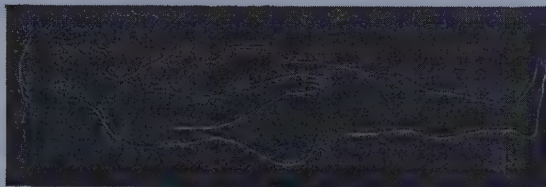


Fig. 91. Effect of Heavy Skirts and Bad Position in a Women of 24.



Fig. 92. Same Young Woman a Year Later, Reformed.



Fig. 93. Young Woman of 22, with Weak Waist.



Fig. 94. Same Young Woman after a Year of Training.



The patient lies upon the couch with the head, not the 440
shoulders, elevated, and with the knees well drawn up so that
the abdominal wall shall be as thoroughly relaxed as possible.

First of all, the patient is made to take several deep breaths, 441
care being taken to see that the abdomen is expanded well with
each inspiration (Fig. 73). In women the reverse is likely to
be the case.

The next proceeding is to lift the entire intestinal mass as 442
follows (Fig. 75): The masseur stands with his right side to
the patient, facing the patient's feet, and places his hands one
in either groin, the hands resting upon their ulnar borders
(little fingers), and having the direction of Poupart's ligament.
The hands are made to move slowly upward, the ulnar borders
being at the same time crowded as deep as may be into the
pelvis so as to grasp as much as possible of the abdominal con-
tents, which are then drawn forcibly upward.

Shaking and rolling movements are valuable as a pre- 443
liminary measure, or used in alternation with the lifting
movements, as a means of loosening up, so to speak, the ab-
dominal contents, to prepare them for gliding easily into their
normal positions. The lifting movements should be executed
in alternation with rolling or shaking movements, from three
to six times.

Inspiratory Lifting (Fig. 74).—I was led to adopt this 444
means of lifting the abdominal contents by a series of studies
for the purpose of noting the influence of respiration upon
intra-pelvic pressures. I observed that the ascent and descent
of the uterus in respiration may be greatly increased by mod-
ifying the inspiratory and expiratory movements. For example,
by directing the patient to take a deep breath and then asking
her to force the breath downward, it was noticed that the pelvic
contents were forced downward to a notable extent; while by
causing the patient to completely empty the lungs, and then, with
the glottis closed, to make a forcible inspiratory effort, the pel-
vic and abdominal contents were made to ascend in a very

remarkable manner. In one instance it was noted that the uterus, which lay quite low in the pelvis, was drawn up more than an inch with each respiratory effort.

- 445** Inspiratory lifting is administered thus: The patient lying upon the back, with the hands at the side, so as to relax the abdominal muscles as much as possible, she is directed to take first a full breath, breathing as deeply as possible, then to completely empty the lungs. Then, instead of drawing in the breath as usual, the glottis is closed, and a strong inspiratory effort is made without the admission of air. By this method the whole inspiratory force is used in lifting the abdominal contents. In this movement the patient should be made to expand the chest, both the upper and the lower parts, as much as possible, as it is desired to suppress the action of the diaphragm so far as can be done voluntarily, while bringing into most active play those muscles of inspiration which act upon the ribs. This not only produces a powerful upward draft upon the abdominal contents, but at the same time enlarges the waist, and makes room for the viscera, so that their ascent is facilitated.

At the same time that the patient executes inspiratory lifting (**444, 445**), the abdominal contents should be lifted from below with the hands, as directed above. The patient should not be allowed to refrain from breathing more than ten or fifteen seconds. During this time, however, from three to five vigorous inspiratory liftings may be made. Then the patient may be allowed to take a few ordinary respirations, and finally a deep inspiration, followed by a complete expiration and a renewal of the inspiratory lifting. Repeat with the patient in the knee-chest position. This procedure is of special value in connection with pelvic massage.

- 446** **Replacement of the Stomach** (Fig. 96).—To accomplish this, lifting of the abdominal contents (**442**) is first executed; then the operator, standing upon the right side of the patient and facing the side, places his right hand upon the left side of the abdomen in such a way that its ulnar border is in contact with the skin and lies in a transverse direction. With the fingers

slightly flexed, the hand is first pressed backward, then carried upward and toward the median line in such a way that the tips of the fingers will sweep along the inferior borders of the false ribs, the movement ending at the epigastrium. The hand should be held at this point while the patient is asked to execute a deep breath ; the procedure is then repeated.

Replacement of the Right Kidney (Fig. 97).—Dis- 447
placement of the kidney is always associated with displacement of the stomach and bowels, hence lifting movements (442) and movements for the replacement of the stomach (446) should be employed in connection with those for the replacement of the kidneys.

To replace the kidney, after making movements to replace 448
the stomach and bowels, the operator proceeds as follows: Standing upon the right side of the patient, the fingers of the left hand are placed behind, while those of the right are placed upon the abdomen; and by movements of the two hands the location of the kidneys is determined. While gently pressing the kidney upward, the patient is asked to take repeated deep breaths. With each exhalation, an effort is made to press the kidney up under the ribs of the right side by gentle pressure. As it moves upward and approaches its position, the right hand is shut, and the closed fist is made to follow the kidney and hold it in position while the patient makes a number of deep respirations.

Replacement of the Left Kidney and Spleen.— 449
The method employed is precisely the same as that for the replacement of the right kidney, except that the operator stands upon the patient's left side, and places the fingers of the right hand behind, manipulating the displaced organs with the left hand.

In all cases of enteroptosis, a proper abdominal bandage 450
must be applied after replacement of the prolapsed viscera, and means must be employed for strengthening the abdominal muscles,—gymnastics, massage, and proper applications of electricity, especially the sinusoidal current.

451 Massage of the Stomach (Fig. 96).—This is one of the most important applications of massage. Its objects are :—

1. To aid digestion by stimulating motor activity.
2. To aid digestion by increasing glandular activity.
3. To empty the stomach mechanically.
4. To restore the prolapsed stomach to its normal position.

452 The most important procedures to be employed are :—

1. Abdominal massage (**389**).

2. Standing upon the right side, and with the back to the patient, place the right hand upon the left side of the abdomen opposite the umbilicus; with the fingers extended and close together, press the ulnar border of the hand backward, at the same time carrying it upward with a vibratory movement. Following along under the ribs of the left side, continue the movement upward to the epigastrium. At this point, before releasing the tissues, place the tips of the fingers of the left hand so as to support the tissues at the point to which they have been lifted by the movement of the right hand, making firm pressure; then withdraw the right hand and repeat the movement. Continue for three or four minutes. If it is desired to empty the stomach, carry the strokes across the epigastrium and along under the lower border of the ribs of the right side.

3. When the object is to aid digestion, combine with these movements deep breathing movements (**441**) and inspiratory compression, obtained by having the patient take a deep breath and hold it for a few seconds while strongly contracting the abdominal muscles.

4. In cases of extreme prolapse of the stomach, in which patients suffer from flow of bile into the stomach, replace the abdominal viscera with the patient in the knee-chest position, standing with the back to the patient's head, grasping the abdomen near the pubic bone, and lifting toward the chest.

Firm compression of the stomach is an efficient means of suppressing vomiting and hiccough.

453 Massage of the Liver (Fig. 98).—This procedure is of great value in chronic cases of catarrhal jaundice, gallstones,

and in numerous cases of so-called torpid liver, and is, in fact, valuable in all cases in which massage is indicated as a means of securing general improvement in nutrition, as in chlorosis, anæmia, emaciation, and impaired digestion. Increased activity of the liver aids digestion, and promotes especially the fat-making processes and blood formation. Massage of the liver is contra-indicated in cancer of the liver, in acute attacks of hepatic colic, in cases of acute gastro-duodenitis, and in hepatic abscess.

The method of procedure is the following, the patient's 454 knees being well drawn up and the shoulders slightly raised, so as to completely relax the abdominal muscles:—

1. Deep breathing with arm raising, four to eight times.
2. Abdominal massage (389). Whatever aids the portal circulation will assist the liver.

3. Tapping (313) over the entire region of the liver (Fig. 31), best executed with the patient lying on the left side, which renders it possible to reach the liver behind as well as in front.

4. Fulling (244).

5. Kneading. Standing at the left side of the patient, place the left hand behind the liver, against the lowermost ribs of the right side, and with the other hand stroke and knead the liver by pressing up underneath the ribs on the right side. When in normal position, the liver lies half an inch above the lower border of the ribs. The direction of the strokes should be from the loin along and beneath the inferior border of the ribs to the epigastrium, and across to the opposite side.

6. Hacking (316) over the liver.

7. Spatting (314).

8. Deep vibration (jarring) (302).

9. Inspiratory compression. Have the patient take a deep breath, and then contract the abdominal muscles as firmly as possible while holding the breath. Compression with the hands may be made over the region of the liver at the same time.

10. Laughing exercise, consisting of the syllable "ha" uttered in an explosive way, and up and down the scale.

- 455 Massage in Diarrhoea.**— Abdominal massage is of very great value in certain cases of chronic diarrhoea. Of these, two very distinct classes are benefited by massage, each requiring, however, a different mode of application. In cases in which undigested food substances are passed soon after eating, indicating excessive peristalsis, with deficient activity of the digestive fluids, abdominal massage should be applied for half an hour a short time before each meal. In cases in which the diarrhoea is due to intestinal catarrh, resulting from dilatation of the stomach, whereby the food is retained in the stomach for so long a time that fermentation takes place, causing irritation of the intestinal membrane when the fermenting food substances at last find their way out of the stomach, massage of the stomach (**451**) should be applied soon after eating, or within an hour after each meal.
- 456 General massage**, especially massage of the shoulders and back, should be combined with abdominal massage in these cases, and massage should be employed at least once daily. Ordinarily, manipulation of the abdomen for ten or fifteen minutes is sufficient when the application is made after meals.
- 457 Pelvic Massage.**— This form of massage, first introduced by Major Thure Brandt, a Swedish gymnast, in 1874, has been variously modified by different physicians who have taken up its employment since the favorable reports of Brandt, especially Norstrom, of Stockholm, Jackson, of Chicago, and Bunge, of Berlin. The method of Brandt and Norstrom consisted chiefly in supporting the uterus with one finger placed in the vagina and behind the cervix, then making intermittent pressure with the other hand placed externally over the fundus, the uterus being compressed between the two hands. Jackson added gentle manipulations of the abdominal walls, and Bunge extended the manipulations to the abdomen.
- 458 Pelvic massage** concerns the following organs :—
1. The uterus.
 2. The uterine appendages— ovaries, Fallopian tubes, broad, round, and other ligaments.



Fig. 96. Replacement of Stomach.



Fig. 95. Prolapse of Colon (Meinert).



3. The vagina, in cases of rectocele and cystocele.
4. The rectum, in cases of prolapsed and relaxed rectum.
5. The prostate in men; sometimes, also, the bladder, in cases in which it is atonic.
6. The coccyx, in cases of coccygodynia, in both sexes.

Pelvic massage should never be undertaken by any person 459 who is not a qualified and experienced physician. The success of this procedure depends, first, upon a correct diagnosis; and secondly, upon special aptitude on the part of the masseur.

It is scarcely possible for a person to become proficient in 460 this special application of massage without personal instruction from some one who has by long experience become skilled in its employment and in the selection of cases to which it is adapted.

It is hoped, however, that the student may obtain an intelligent idea of pelvic massage by the following description of the method which some twelve years' experience has led the writer to adopt:—

Position.—The patient lies upon the back, with the heels well drawn up, the knees separated, the hips slightly elevated, arms by the side, and the head (not the shoulders) supported by a thin pillow.

1. Preliminary movements (461-467).
2. Intermittent compression of the uterus (468-470).
3. Digital kneading of the uterus (471).
4. Lifting movements (472, 473).
5. Vibration of the uterus (474).
6. Kneading of the appendages (475).
7. Digital kneading of the round ligaments (476).
8. Stretching of adhesions and kneading of exudates (477).
9. Nerve compression (478).
10. Massage of the abdominal muscles (480).
11. Finishing movements (481-483).

1. *Preliminary Procedures.*—The manipulations practiced 461 in pelvic massage are rendered very much more efficient by the application of a few preliminary movements for the purpose of placing the abdominal and pelvic contents in the most favor-

able condition possible in any given case. It should be remembered that in pelvic displacement there will always be found, also, displacement of the abdominal contents. When the uterus falls backward, the folds of intestines which have formerly been behind it, aiding and supporting it in its position, change their position, overlying it above and in front. Replacement of the uterus requires, first of all, a replacement of the intestines; in other words, room must be made for it in its old position before it can be restored to its normal place.

462 It should also be borne in mind that in most cases, displacement of the pelvic viscera is accompanied by a serious disturbance in the positions of the various abdominal organs. There will be found in nearly every case of this sort, displacement of the colon and stomach, and not infrequently displacement of one or both kidneys, and occasionally downward displacement of the liver. It is consequently evident that pelvic massage should always be preceded by such manipulations as will, so far as possible, aid in the restoration of the abdominal viscera to a normal position and condition.

463 The preliminary movements which I have found most effective, are : (1) Deep breathing ; (2) Lifting abdominal contents ; (3) Inspiratory lifting.

464 (1) *Breathing Movements*.—The patient is made to execute a few full breaths (Fig. 73), in which the lower part of the chest and the abdomen are well expanded with inspiration, and drawn in as far as possible with expiration.

465 (2) *Lifting the Viscera*.—After the patient has taken three or four deep breaths, the physician stands at the patient's left, and, with his back to the patient, places the ulnar edge of the two hands, with the fingers extended, just over Poupart's ligament, and parallel with the ligament, the fingers pointing toward the pubes. From this position the hands are moved slightly upward, the edge of the hands being made to sink as deep into the abdomen as possible without severe pain, the arms being slightly rotated at the same time, and the hands drawn upward in such a way as to grasp the contents of the

abdomen and drag them upward. This movement is repeatedly executed during the act of inspiration, the patient continuing to take deep and full breaths, expanding the lower chest and abdomen as previously described. See that all displaced viscera are in perfect position.

Essentially the same movement may be executed with the patient in the knee-chest position. The masseur stands with his back to the patient's head, and reaching around the patient with one arm, drags the bowels upward during inspiration. 466

(3) *Inspiratory Lifting* (Fig. 74).—A number of years ago, when engaged in a series of experimental studies of intra-abdominal pressure, and while one day administering pelvic massage to a patient in whom the uterine supports were greatly relaxed, I observed that with each forcible inhalation the uterus was lifted upward a distance of half an inch or more. I noticed also that the patient was breathing almost wholly with the upper chest. In order to intensify the effect of the inspiratory lifting, I caused the patient to exhale completely, and then to make the movement of inspiration by lifting the upper chest forcibly while keeping the glottis closed, so that the air could not enter the lungs. The effect of this procedure was very remarkable, the uterus being lifted in an upward direction more than an inch. 467

2. *Intermittent Compression of the Uterus*.—The preliminary movements being completed, one, or, when possible, two, fingers (index and middle fingers) of the left hand are introduced into the vagina and crowded upward behind the cervix, the uterus being first placed in perfect position, then lifted upward and forward as far as possible without giving too much pain. The extended fingers of the right hand are at the same time pressed upon the abdominal wall just above the pubes, so as to impinge upon the fundus, covering as large an area of the uterus as possible. Firm, intermittent pressure is then made, continuing for two or three seconds, with intervals of one or two seconds, this being repeated six to twelve times. In this procedure the pressure of the external hand will fall chiefly upon the top of the fundus. 468

In many cases it is difficult to tilt the uterus forward, even after the previous lifting of the abdominal contents which has been described. In the effort to restore the uterus to its normal place, much assistance may be obtained from manipulations with the hand employed externally. The extended palm may be used in lifting the abdominal contents, working from the pubes upward; or the closed fist may be pressed backward just above Poupart's ligament and the pubes, and crowded upward while the patient makes breathing movements. By this means the way may be cleared, so that the tips of the fingers can finally be gotten down behind the uterus, even in cases of retroversion.

Sometimes the cervix must be grasped between the two internal fingers and used as a lever to pry the fundus up, when the organ has sufficient firmness to admit of such a procedure. It is often necessary to work the fingers of the external hand down upon one side at the same time that the internal fingers are crowded up as high as possible. In this way a fundus lying in the hollow of the sacrum may be slid up over the promontory of the sacrum, when the fingers of the external hand, working down beneath it, will quickly bring it into position.

469 When the vaginal orifice is too small to admit of two fingers, a useful application of massage may be made by the aid of one finger introduced into the vagina, or even a single finger operating through the rectum. A single finger, however, has less perfect control of the uterus, and in cases of extreme backward displacement it is often impossible to completely replace the uterus by means of one finger only working internally. A better method, in cases in which the vagina will admit of but one finger, is to introduce the forefinger into the vagina and the middle finger into the rectum. The remaining fingers of the hand should not be flexed, but extended and separated from the middle finger, and slid over the coccyx. A special advantage in the last-named method is that it facilitates palpation of the ovaries and tubes, the movements of the middle finger not being restricted by the vaginal walls.

Without allowing the uterus to drop down in the pelvis, 470 the two fingers of the left hand are now transferred to the front of the cervix, the uterus being supported by the external hand, the fingers of which are made to pass down deep behind the fundus. The intermittent pressure previously described is now renewed, the uterus being pressed from before backward. This procedure should be repeated six to twelve times.

These procedures must be executed with the greatest care to avoid giving the patient pain, thereby exciting contraction of the abdominal muscles, which necessarily interferes with the manipulation.

3. *Digital Kneading of the Uterus.*—The fingers of the left 471 hand being returned to the first position behind the cervix, thus supporting the organ, the fingers of the right hand execute a circular digital kneading movement, beginning at the top of the fundus, and enlarging the circle until the fingers are made to press down the sides of the uterus and all about it. A slight change in the direction of the pressure made by the fingers of the left hand enables them to antagonize constantly the movements of the right hand, so that the uterus may be by this means very thoroughly manipulated in nearly all cases, and except in patients who are very fleshy. This procedure is continued from one to five minutes.

4. *Lifting Movements.*—The preceding manipulations will 472 have completely freed the uterus from the overlying intestines, so that the top of the fundus will be lying in immediate contact with the peritoneal surface of the anterior wall of the abdomen. By the combined action of the internal and external hands, the uterus can now be freely lifted forward so that its form may be easily outlined by the fingers of the right hand. The action should be intermittent.

After lifting it forward as far as possible without inconven- 473 iencing the patient, the uterus is released, and allowed to drop down, then again lifted, the action being repeated six to twelve times, at intervals of two to three seconds, the uterus being held forward for a like period. The purpose of the lifting is

to bring the blood vessels under tension, thus emptying the venous sinuses, which are filled with fresh blood as the uterus returns to its former position.

- 474 5. *Vibration of the Uterus*.—While supporting the organ with the fingers of the left hand behind the cervix, the thumb or one or more fingers of the right hand, is applied to the top of the uterus, and fine vibratory movements are communicated to it. This is a powerful means of stimulating the uterine circulation.
- 475 6. *Digital Kneading of the Appendages*.—In pelvic massage the manipulations should not be confined to the uterus alone. The ovaries, tubes, and the broad and round ligaments may be masséed thus: After lifting the uterus well forward, freeing it from the overlying intestines, the fingers of the left hand are directed toward an ovary. Starting as low down as possible, firm pressure is made in an upward direction, while the fingers of the external hand are made to coöperate in an effort to grasp beneath the ovary and tube and lift them forward. At the same time, gentle digital kneading movements are executed, the pressure of the external (right) hand being directed toward the fingers placed internally.
- 476 7. *Digital Kneading of the Round Ligaments*.—The fingers in the vagina should be directed toward the inguinal canal while digital massage is executed by the fingers of the right hand traveling in a curved line from the external ring along the side of Poupart's ligament and toward the fundus. The internal fingers will, to some extent, follow the movements of the right hand, so as to compress the tissues between the fingers of the two hands.
- 477 8. *Stretching of Adhesions and Kneading of Exudates*.—When adhesions and exudates are present, firm pressure should be made directly upon the bands of adhesion or the masses of exudate with the tips of the fingers which operate internally, counter-pressure being made externally; and, so far as possible, the morbid parts should be grasped between the fingers of the two hands, and thus subjected to digital massage. Adhesions

are also stretched by the lifting movements of the uterus previously described.

9. *Nerve Compression*.—The sacral plexus of the spinal 478 nerves and several of the lowermost pairs of ganglia of the sympathetic are accessible to digital pressure through the vagina; and in appropriate cases these, as well as other nerve structures, may be stimulated by gentle compression in connection with other procedures. One of the largest nerve masses accessible to compression through the vagina is the hypogastric plexus, which is located on the anterior surface of the sacrum, just below the promontory. A row of four or five sympathetic ganglia lies on either side of the median line just over the junction of the sacrum and the ilium, the anterior aspect of the sacro-iliac synchondrosis. A single ganglion (*coccygeal ganglion*, or *ganglion impar*) lies in front of the coccyx. Pressure made upon these points stimulates the ganglia and their branches, and by this means excites the circulation in the pelvic vessels.

Nerve compression in this region, as in other parts of the body, must be applied with very great discretion. This procedure should never be employed in cases in which inflammation, active congestion, or excessive hyperæsthesia exists. It is only appropriate in cases of passive congestion, atony, sub-involution, and general relaxation of the parts.

It is generally well to alternate some of the above-described 479 procedures, especially the lifting and kneading movements, instead of adhering closely to the order in which they have been given for the purpose of precise description.

Upward deep kneading movements executed with the closed fist may be advantageously alternated with the other movements mentioned.

10. *Massage of the Abdominal Muscles*.—After the internal 480 manipulations, the muscles of the lower abdomen and inner thighs should be gently masséed. The procedures most useful are the following, employed in the order named: Tapping, hacking, spitting, centripetal friction, and finally, stroking.

11. Finishing movements :—

- 481 (1) Knees separating, breathing. The patient should inspire while separating the knees, and expire while closing them. The vigor of the exercise may be increased by making a slight resistance to the movements of both adduction and abduction (Fig. 71). The movements should be made at the rate of ten to twelve per minute.
- 482 (2) Hips raising (Fig. 82), breathing in as the hips rise, and breathing out as they sink. This movement should be repeated from four to eight times. The movements of knees separating, hips raising, and breathing may be executed simultaneously.
- 483 (3) The treatment should be concluded by having the patient turn upon the face, and administering percussion—tapping, hacking, spitting, beating, and clapping over the sacrum and fleshy portions of the hips.
- 484 The following points should be carefully observed in the administration of pelvic massage :—
1. Never administer pelvic massage to erotic patients, nor in cases of vaginismus, acute pyosalpinx, pelvic abscess, growing tumors of the uterus or ovaries, rectal ulcer, acute vaginitis, irritable urethra, or inflammation of Skene's glands, until after these conditions have been removed. The best results are obtained in cases of subinvolution of the uterus, relaxed ligaments, recent exudates, and passive congestions with little sensitiveness. Kesch recommends that uterine massage should be applied especially during menstruation, but does not give what seem to the writer to be valid reasons for the recommendation. My opinion is very positive that massage should be discontinued during this period.
 2. Before treatment, have the patient thoroughly empty the bladder and bowels, employing an enema, if necessary, or a colocolyster (large enema in right Sims's or in knee-chest position). A hot vaginal douche should also be administered.
 3. No movements should be made with the hand used internally except with the ends of the fingers.

4. The force employed should generally be sufficient to produce slight pain.

5. In cases of flexion, the flexion should, if possible, be straightened during the manipulation. In all cases of displacement, the uterus must be restored to proper position.

6. Care must be taken to have the patient breathe deeply and regularly during treatment.

Massage of the Prostate.—In cases of enlarged prostate due to thickening from inflammation, especially in recent cases, much can be accomplished by massage properly administered. Massage of the prostate should be preceded by abdominal massage, and followed by inspiratory lifting, deep breathing, and percussing the sacrum (313-317). 485

1. Introduce one, or better two, fingers, well oiled, into the rectum, making firm pressure against the prostate, but taking care not to press so hard as to bruise the membranous urethra. With the right hand, make pressure just above the pubes. After pressing the parts for two or three seconds, allow a rest for an equal period, repeating the pressure from six to twelve times.

2. Make gentle friction over the prostate in a downward direction for the purpose of pressing out of the ducts the stagnant secretions.

3. Make gentle friction over the prostate by pressure of the fingers, moving from below upward, covering the posterior surface of the organ, to empty the blood-vessels.

Care should be taken to have the patient empty the bowels and bladder thoroughly before the treatment is applied. Sometimes the patient is unable to completely empty the bladder; in such cases a catheter should be passed.

Massage of the Coccyx.—This procedure is useful in cases of coccygodynia accompanied by painful points adjacent to the coccyx or its ligaments. The bowels and bladder should be first emptied, as in all forms of pelvic massage. Proceed as follows:— 486

1. With the patient in the right Sims's position, pass one finger, or better two fingers, of the left hand into the rectum, applying them to the anterior surface of the coccyx. With the fingers of the other hand applied externally, make a suitable degree of pressure, and knead the affected parts between the fingers, giving special attention to points of induration or pain. In cases in which the parts are extremely tender, begin the movements at a little distance from the most painful points, gradually encroaching upon the more sensitive tissues. The manipulation may be continued for three to ten minutes.

2. Apply to the sacrum, tapping (313) and hacking (316) movements; to the more fleshy parts, clapping (315), spitting (314), and beating (317).

3. Employ deep vibration, placing the hand over the lower end of the spine (302).

4. Apply stroking with the palm of the hand from the coccyx upward, outward, and downward along the inner surfaces of the thighs.

487 Massage of the Rectum.—This procedure is useful in cases in which the sphincter muscle is relaxed, and applicable to many cases in which the muscle has been over-stretched by officious and unnecessary dilatations applied by so-called “official surgeons.” The most important movements are the following:—

1. Percussion with the finger tips, tapping (313).

2. Fulling (244) about the verge of the anus, care being taken to avoid bruising the parts, which should be well lubricated. The manipulations should be very delicate, the tissues being carefully picked up with the ends of the fingers and thumbs.

3. Thumb kneading of the anus and the tissues immediately adjacent, care being taken to roll the parts in when they are everted.

4. Hacking (316)

5. Beating (317).

6. Pressure (154) and vibration (302). Firm pressure with the palmar surface of the fingers or with the closed fist in an upward direction, accompanied by a vibratory movement.

7. Percussion of the sacrum and hips, as in massage of the prostate and coccyx (485, 486).

8. Inspiratory lifting (467).

Massage of the rectum should be preceded by abdominal massage. This procedure, as well as the following, is seldom required.

Massage of the Vagina.—This procedure is useful in 488 cases of rectocele, cystocele, and relaxed vagina, and is applicable to cases in which for any reason a suitable surgical operation cannot be performed. It is also valuable in cases of rigidity of the perineum, as a preparation for confinement, for which it may be employed daily during the last six or eight weeks of pregnancy. It should be resorted to in all cases of pregnancy in which there has previously been an operation for repair of the perineum. Proceed as follows:—

1. Lifting abdominal contents (465).

2. Lifting uterus and appendages (472), two fingers of the left hand being placed internally, the other hand coöperating externally, as in massage of the uterus.

3. With patient in knee-chest position, lift the bowels (466).

4. With knee-chest or Sims's position, fingers placed upon thighs, tips of thumbs at the mouth of the vagina, roll the tissues in as much as possible, lift upward, and manipulate the perineum with the thumbs.

5. With the index finger of the left hand in the rectum and the thumb in the vagina, compress and knead the posterior wall of the vagina.

6. With the closed fist firmly placed upon the perineum, make strong vibratory movements (302).

7. Apply percussion to the sacrum and the buttocks (483).

8. With patient lying upon the back, the heels well drawn up, raising of hips and full breathing (482).

9. Knees separating and breathing, with resistance (481),
10. Inspiratory lifting (467).

489 Massage of the Face.—This procedure is useful for developing the muscles of the fleshy portion of the face, improving the circulation (hence the complexion), removing wrinkles, especially about the eyes and the corners of the mouth, and also relieving facial neuralgia and muscular twitching.

490 For persons with fleshy faces, about all that can be done by general facial massage is to knead the tissues by compressing them with the thumb and fingers against the underlying bony surfaces, working outward from the mouth, the nasal openings, and the eyes. Care should be taken to work toward the points at which the blood vessels emerge.

491 In persons with thinner faces, the tissues of the cheek may be grasped between the thumb and finger. When indurations are present, the protected finger may be introduced into the mouth and placed against the cheek, while massage is applied with the tip of the thumb or with the fingers of the other hand. The little finger, covered with soft cotton, may be introduced into the nose and ears, although this procedure is very seldom required. Make use of the following manipulations :—

492 1. Digital kneading, working outward from the eyes, nose, and mouth, at which points many muscles find their insertion.

2. Petrissage, or grasping-kneading of the muscles of the face.

3. Massage of the orbit (Fig. 101), care being taken to avoid the eyeballs. Place one thumb upon the lower lid and the other just beneath the eyebrow, within the margin of the orbit. Make traction outward, drawing upon the inner corner of the eye; then change the position of the thumbs so as to massé all the muscles about the eye. Massage about the eye improves both the nerve and the muscular tone of the eye, and in this way often relieves muscular asthenopia, frequently due to general weakening of the eye, which renders annoying or injurious slight muscular inequalities which are not noticeable



Fig. 99. Wrinkled Face before Massage.



Fig. 100. Massage of Face for Removal of Wrinkles.

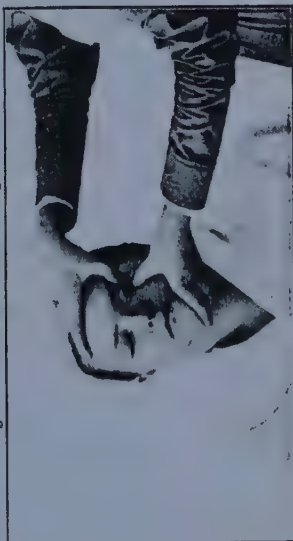


Fig. 101. Massage of Orbit.

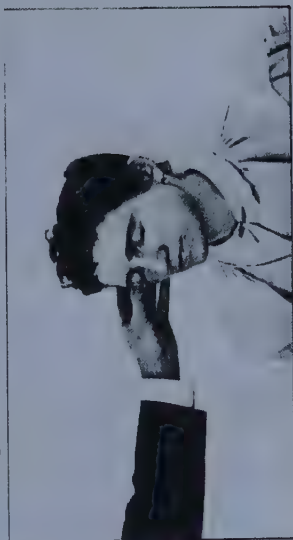


Fig. 102. Massage of Eye.

when the muscles are well developed. The attention of those neurologists and oculists who think it necessary to operate upon every case of muscular asthenopia is especially called to this statement. The habit of rubbing the eye for relief, which prevails almost universally among persons thus suffering, is a strong suggestion of the utility of massage administered systematically and in a skillful manner.

Special attention should be given to the nose, working from the root of the nose downward and outward. Relief is often afforded in cases of nasal obstruction from catarrh by facial massage, which is due to the fact that the lymphatics of the face arise from the mucous membrane of the nose. 493

Massage for Wrinkles.— Facial massage may be made useful in removing wrinkles (Figs. 99 and 100), which as often indicate unhealthy tissues as advancing age or a wearisome existence. Wrinkles are best relieved by making traction upon the skin in a direction at right angles with the wrinkles, the wrinkled part being thoroughly manipulated to restore the natural flexibility of the skin, which has been lost. The patient must also be taught how to smooth out the wrinkles by cultivating a suitable facial expression. For example, the vertical wrinkles of discontent or despondency may be made to disappear by smiling, which wrinkles the face in an opposite way. 494

In friction of the face, special care should be taken to avoid making so great pressure as to cause irritation of the skin. 495

Compression of the nerve trunks which supply the face is a valuable procedure in many cases. The chief points to which pressure should be applied are shown in Fig. 32. 496

The different useful procedures in general facial massage may be applied in the following order :— 497

1. Digital kneading of the cheeks, nose, and orbit.
2. Petrissage.
3. Stroking, localized as may be indicated when wrinkles are present.
4. Ear rolling (503 [3]).

5. Stroking along the inferior border of the lower jaw.

6. Friction of the neck (433, 435).

498 **Massage of the Eye** (Fig. 102).—Massage of the eye was first suggested by Donders. The writer first saw it applied by Landolt, of Paris. It has been found to be useful in ulceration and cloudiness of the cornea, hypopyon, and in the early stage of glaucoma. Massage of the eye increases the vascularity of the eye, and encourages drainage.

499 Reibmayr noted that when masseing one eye, the other eye became, during the first minute, dilated; second minute, contracted; while in the third minute, the pupil of the eye masséed became smaller than the other, showing that massage of the eye, through reflex action, affects the controlling nerve centers as well as the eye itself.

500 Massage of the eye must be applied with very great delicacy of touch. Proceed as follows: Have the patient close his eye; place the fingers of the hand upon the temple a short distance from the orbit, and the tip of the thumb upon the upper lid of the closed eye. Make gentle rotary movements, gradually increasing the pressure, but taking care that it be not so great as to cause pain. Patients whose eyesight is impaired often remark that they are able to see better after the application.

501 **Massage of the Ear** (Fig. 103).—This procedure is of great value in middle-ear disease, catarrhal disease of the Eustachian tubes, in chronic disease of the middle ear unaccompanied by suppuration, and in cases of perforated membrana tympani. It may also prove useful in cases of tinnitus aurium.

502 Politzer recommends derivative massage as a means of relieving the pain of otitis media and of furuncles. In case of acute inflammation, the manipulations should be confined to the tissues about the ear, avoiding the ear itself.

503 The following procedures are the most effective:—

1. Digital kneading, friction, and stroking about the ear,—in front, behind, and beneath. This procedure is especially useful as a derivative measure.

2. Intermittent pressure upon the tragus in such a manner as to close the external meatus. The pressure should be both applied and withdrawn suddenly, but without too great force. The rate should be sixty to one hundred per minute. Its purpose is to exercise the structures of the middle ear.

3. Ear rolling (Fig. 103), with the fleshy portion of the thumb applied to the ear in such a manner as to cause it to fit into the external ear, and close the orifice; the right hand to the left ear of the patient, and the left hand to the right ear. By means of a rolling movement, the ear will be stretched in different directions, and the meatus may be opened and closed in such a manner as to secure alternate compression and rarefaction of the air in the external auditory canal, thus imparting movement to the membrana tympani and to the ossicles connected with it. This measure may often replace the mechanical means ordinarily used for treating the middle ear.

4. Stroking of the Eustachian tube, by pressing one or two fingers into the furrow behind the maxillary bone, starting close to the ear, and following the groove down beneath the jaw. By pressure thus applied to the Eustachian tube, it may be emptied of obstructing mucus; and when in a state of chronic inflammation, useful reparative processes are set up. An itching in the throat from which many patients complain is frequently due to an irritation at the orifices of the Eustachian tubes, which may be readily relieved by this means.

Massage of the Larynx (Fig. 104).— This measure is especially valuable in chronic disease of the larynx, particularly in cases in which the vocal cords are relaxed, or in which there is weakness of voice from insufficient development of the laryngeal muscles. The object aimed at in massage of the larynx is to relieve congestion, if it exists; to improve the blood and lymph circulations, stimulate nutrition, and thus strengthen the muscles and the nerve supply of the part.

The following are the most useful procedures :—

1. Derivative massage of the neck (433, 435).
2. Fulling (244) of the skin overlying the larynx.

3. Digital kneading (268), in which the fingers are worked into all the irregularities of the larynx, and between it and the surrounding tissues.

4. Lifting, in which the larynx is seized between the thumb and finger just below the *pomum Adami*, and crowded upward. The vigor of this procedure may be increased by holding the larynx up while the patient swallows.

5. Tapping (313).

6. Deep vibration (seize larynx and vibrate) (302).

Friction strokes are intermingled with the other measures mentioned.

506 Massage of the Heart.—The position of the heart would seem to render it inaccessible to the application of massage; but Oertel, in 1889, contributed to the literature of massage, a paper upon “Massage of the Heart,” in which he claims to have obtained great advantage from the use of massage in such a manner as to influence the heart directly. He employs massage of the heart especially in connection with his system of treatment by mountain climbing, and considers it indicated in the following conditions:—

1. When the heart muscle is weak, either as the result of anæmia, impaired nutrition, or obesity.

2. When the arteries are imperfectly filled, resulting in passive or venous congestion.

3. In cases in which there is mechanical obstruction in the circulation, resulting from valvular lesions, diminution of the respiratory field, pressure of tumors, or anything which increases the work of the heart.

4. In connection with gymnastics for strengthening the heart.

507 Massage of the heart is contra-indicated—

1. In acute or recurring endocarditis or pericarditis.

2. In myocarditis.

3. In sclerosis of the coronary arteries and in general arterio-sclerosis.

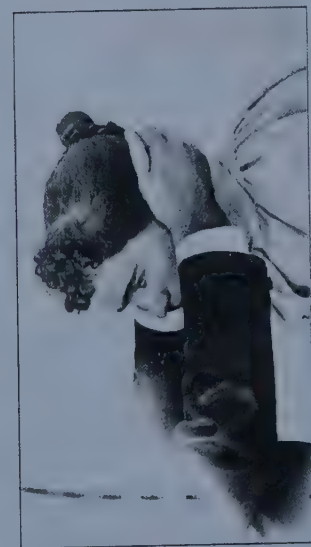


Fig. 103. Massage of Ears



Fig. 104. Massage of Larynx.



Fig. 106. Massage of Heart-finishing position.

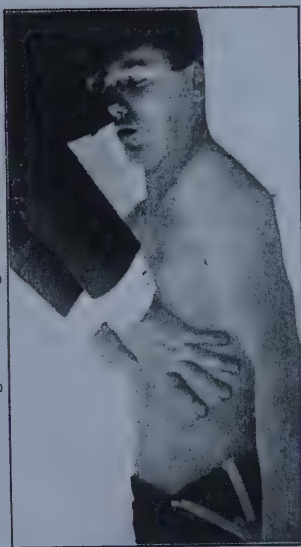


Fig. 105. Massage of Heart-Beginning position.

Massage of the heart is applied during expiration only, and 508
in the following manner: With the patient reclining, the head supported upon a pillow, the masseur stands at his head, and, bending over the patient, applies his hands to the sides of the chest at its extreme upper part, the fingers touching the chest at the axilla, while the thumbs are directed toward the sternum (Fig. 105). The patient should be instructed to breathe deeply, slowly, and regularly. At the end of inspiration, and just as the act of expiration begins, pressure should be made with the hands, which at the same time should move gradually downward and forward until the thumbs fall upon the xiphoid cartilage (Fig. 106). The effort should be made to narrow the chest laterally, and at the same time to compress it antero-posteriorly. It is especially important to prevent increase in the antero-posterior diameter of the chest during expiration. The application of pressure should be gradual, increasing as expiration proceeds and as the hands glide downward. The greatest force should be applied between the fifth and eighth ribs, the maximum of pressure falling over the latter.

Massage of the heart is beneficial —

509

1. In completing the act of expiration.
2. Through direct pressure made upon the heart, whereby its nutrition is favorably influenced, as in massage of other muscles.

Massage in Scoliosis.—Apply massage (426) only after 510
first putting the patient into a correct position. The following procedures are helpful in accomplishing this: In mild cases, patient lying on face, arms stretched upward; in cases in which the patient has lost the power to correct the deformity by voluntary effort, side lying on quarter circle, concave side uppermost. Massage may also be applied with the patient suspended by head and shoulders, or hanging by the arms.

Untwisting the Patient.—The patient, sitting, passes the 511
arm of the high side in front, with the hand on the opposite

shoulder; while the hand of the low side is passed behind, and rests upon the back. Useful in cases of rotation.

512 Three degrees of deformity may be described:—

1. Deformity reducible by the patient's unaided, voluntary efforts.

2. Deformity readily reducible by manual assistance or such mechanical assistance as the patient can apply.

3. Deformity irreducible by manual assistance, and not easily reducible by mechanical aid.

513 The first class is curable; the second class may be curable, and can certainly be benefited; the third class is incurable, but may possibly be somewhat improved, and will require the permanent use of mechanical support.

514 *Method of Testing the Patient's Ability to Correct Deformity without Assistance.*—

1. Give usual directions for correct standing (**575**) (Figs. 108, 109, and 110).

2. Rest-standing position (hands at back of neck, arms in line).

3. Standing, arms stretched upward.

4. Rest-close-standing (heels and toes together).

515 *Exercises.*—The following exercises are valuable for patients of this class, to be used in connection with massage:—

1. The patient sitting untwisted (**511**), leans forward, then raises the body backward against resistance applied to the head.

2. The patient sitting untwisted, operates a pulley weight with each hand.

3. Rowing, sitting on an inclined plane, high side of body on high side of seat.

4. Sitting on an inclined seat, untwisted, use pulley weights in opposite directions, high side pulling down, low side pulling up; high side pulling from behind, low side from in front; both sides simultaneously pulling from opposite sides toward the body.

5. Hanging from swinging rings or "ladder-wall," the low side grasping higher than the high side.

Method of Correcting Curvature by Manual Assistance.— 516

1. For posterior curvature, patient should bend forward at hips, holding hips back. As the patient rises, press upon the convexity of the curve; and tell him to raise the chest, and draw the head back and the chin in.

2. Patient should take downward-bend position; one side of back higher than the other indicates rotation (see accompanying cut). Masseur, placing one hand upon highest part, and having the patient rise, should at the same time make gentle resistance.

3. Patient should stand facing the table, thighs touching the table, and bend forward at the hips; head erect, chin well drawn in. Masseur should place his hands upon the convexity of the curve, and have the patient raise the trunk backward.



SPINAL CURVATURE WITH ROTATION.

4. Patient standing, the masseur should place one hand on the convexity in front, the other on the convexity behind, and stroke with firm pressure from before backward. If necessary, repeat with the patient in rest-standing position, or rest-forward-bend standing.*

In applying massage to the back in scoliosis, particular at- 517
tention should be given to percussion, especially of the concave side. Use all the different kinds of percussion movements. Make pressure upon the prominent surfaces. Endeavor to work the spines into position by pressure and manipulation with the thumbs. A daily hot and cold douche or sponging of the back is of great importance in these cases, as a means of stimulating the nutrition of the tissues

- 518 Massage of the Joints.**—There is no single class of cases in which the benefits derived from massage are more evident than in those of chronic joint disease or of recent injury to the joint; at the same time there is no one class of cases in which large discretion and experience are of greater importance. Excessive manipulation of an irritable joint or of a joint the ligaments of which have recently been injured, as in case of a bad sprain, may do almost irreparable injury, and will certainly subject the patient to a great degree of unnecessary suffering, and may discourage him altogether, thus depriving him of the great benefits to be derived from massage skillfully administered. It may be laid down as a principle, that massage of the joints should never be applied in such a manner as to produce any considerable degree of pain. Slight pain is often produced by the first manipulations, especially in cases in which there has been much loss of motion, but the pain thus induced should be of a transient character, subsiding within a short time after the manipulation. When the pain increases for some days afterward, the manipulation has been applied in a violent or bungling manner, or the application should have been derivative rather than made directly to the joint.
- 519 A matter which requires the most careful discrimination is that of determining when manipulations should be applied directly to the joint, and when above or below it. Briefly, the best advice upon this point is this: When a joint is very sensitive, derivative massage only should be employed for a week or ten days at the beginning, the manipulations being gradually brought nearer the joint from day to day.**
- 520 A careful examination of the tissues in a case of chronic rheumatism of a joint will show rheumatic nodules lying along the course of the lymphatics above the joint. In a fleshy person it is not always easy to find these, but a delicate touch will generally discover them. The work should begin upon the tissues above the joint for the purpose of opening up these**

obstructed channels, and thus acting indirectly upon the lymphatics and blood vessels of the joint.

The derivative effects may be greatly increased by giving 521 special attention to the healthy joint next above the affected joint, in the employment of strong traction, pressure, and other joint movements. The lymph and blood channels are largest in the vicinity of the joints, and by acting upon these by means of joint movements, pressure, and manipulations, the vessels of the joint below may be drained, especially after the lymph channels connecting the two have been opened up.

It must not be forgotten that in cases of chronic joint disease 522 the muscles and other tissues about the joint are affected, as well as the joint itself. This is especially true of chronic rheumatism, and is evidenced by muscular atrophy, induration, or fatty degeneration, one or the other of which conditions is nearly always present in chronic joint disease.

It is useful to know that certain muscles or muscular groups 523 suffer more than others in connection with joint disease. For example, when the knee is involved, the *quadriceps* atrophies; in hip joint cases, the *glutei* muscles are chiefly affected; in cases of the elbow, the *biceps* and the *brachialis anticus*; in cases of the shoulder, the *deltoid* and *supra-* and *infra-spinatus*. 524

In *derivative massage* (238), fulling, friction, and deep kneading are most effective. In the manipulation of a joint, begin with light friction and pressure. If these applications are tolerated, add digital massage, working between the ligaments, and following all the irregularities of the ends of the bones and the articulating surfaces so far as accessible. Later, add percussion, first tapping, afterward hacking.

Joint movements should be employed from as early a 525 period as possible in cases of joint disease, so as to prevent the limitation of movement, or to restore motion which has been lost. The application must at first be very gentle indeed, and should not be carried to such an extent as to produce continued pain. The derivative manipulations which are first em-

ployed should be continued in connection with applications to the joint, since the effect of kneading a joint is to increase the circulation through it; while the effect of derivative massage is not to carry the blood through the joint, but rather around it, thus relieving excessive local congestion, or hyperæmia, by diverting the blood into other channels.

- 526 By the combination of local and derivative massage applied in connection with compression of the joints and gentle joint movements (342), the vital activity of the part may be greatly increased. In cases of extremely painful joints in which heat and congestion are marked symptoms, derivative massage may be employed upon the soft parts both above and below, and joint movements should be applied to the joint above, care being taken to avoid motion of the affected joints.
- 527 Centripetal friction applied to the tissues and next joint above, relieves painful joints by increasing the surface circulation, and so diverting the blood from the joint itself. Downward stroking below the joint also affords relief by lessening the supply of blood to the joint.
- 528 The cautions which have been given respecting the manipulation of affected joints, apply, of course, only to those in which the disease is active, or to painful or congested joints. In many old cases of joint disease there is a decreased vascularity and also a morbid and decreased secretion, as is evidenced by a grating, snapping noise, and other sounds induced by motion of the joint. When this condition exists, the massage should be applied directly to the joint itself. Even though it should have the effect to slightly increase the pain at first, the ultimate result will be improved nutrition of the joint, and the restoration of the normal secretion. I have seen some most remarkable results in cases in which improvement would certainly have been regarded as most improbable.
- 529 In rheumatic gout and in old cases of rheumatism, very persevering efforts are required. The maximum amount of benefit to be derived from massage is not always obtainable except by its continuous employment for several months, and

sometimes even two or three years. In one case under the writer's care,—a lady who had suffered from rheumatic gout for many years,—the limbs were flexed to nearly a right angle, and the patient had despaired of again standing upright; but at the end of two years she was able to walk erect without the aid of a cane.

In cases of chronic rheumatism and rheumatic gout, it 530 must be remembered that the patient is suffering from a diathesis, and that the disease is not a purely local malady; consequently, general massage, hydrotherapy, proper regimen, and other measures must be combined with the local treatment.

It is of great advantage also, to employ local applications 531 of electricity as well as hydrotherapeutic measures, in these cases. The irritation occasioned by manipulations is usually promptly relieved by a hot fomentation, followed by a heating compress, which should be applied thus: Wring a linen towel out of water as cold as can be obtained. If the patient is feeble, it should be wrung dry; in a more vigorous person, a larger amount of water may be retained. The towel is wrapped tightly about the joint, and is then covered with oiled muslin, and closely wrapped with several folds of flannel, which should be applied in such a manner as to prevent any air from reaching the moist surface. It is generally well to change these compresses three or four times a day. When there is considerable heat in the joint, they may be changed more frequently with advantage.

In old cases in which the tissues are much relaxed, or in 532 which secretion is deficient, the hot and cold douche is the most effective means of stimulating the vital activities of the joint. Massage and hydrotherapy combined are twice as beneficial in the treatment of chronic joint troubles as either used alone. Together they are capable of effecting a cure in every case in which a cure is possible.

Massage for Sprains.—The treatment of sprained joints 533 by massage is by no means a recent idea. Massage has been thus employed in Germany for more than thirty years, and was

used in England half a century ago ; but the method is so diametrically opposed to that in common use by the profession, that it has been but slowly adopted. It also requires special skill, while the employment of the old method of immobilization is compatible with any degree of ignorance and stupidity.

The value of this method is now so well established that it is not necessary to offer statistics in support of it. Any physician who has once had the satisfaction of seeing the victim of a severe sprain walking about without inconvenience at the end of a week or ten days, who under the old régime would have been crippled for months, and possibly have suffered the loss of a limb, will require no further argument to convince him of the efficacy of this mode of treatment. Much skill and experience are needed, however, to enable a masseur to accomplish a rapid cure. The following is the method :—

- 534 Apply massage as soon after the injury as possible, beginning with derivative manipulations of the soft parts above the affected joint and of the joint next above it. Centripetal friction, with quite firm pressure, applied very carefully, may be advantageously employed upon the joint itself from the very first, but other manipulations of the joint itself should be deferred for a day or two. The derivative manipulations should gradually approach the joint from above, until by the second or third day the joint itself is reached.
- 535 Careful joint movements should be executed after the second day, pains being taken not to carry flexion or extension so far as to produce the feeling of resistance, as this will bring a strain upon the bruised or lacerated ligaments or pressure upon the injured articulating surface. If there is much swelling, the external tissues are probably the chief seat of injury. Both external and internal parts may be injured.
- 536 At first, when the manipulations are very light in character, the massage should be applied twice daily ; later, when more vigorous measures of treatment are employed, once a day is sufficient. After each manipulation, apply a tight bandage, taking care to begin the bandage at the toes. If there is

much pain, apply a hot pack, followed by a cool compress, for an hour; or place the feet in hot water, and gradually increase the temperature until it is as hot as can be borne. Continue bath for fifteen minutes. This is an excellent means for relieving local congestion. It may be used once or twice a day, the bandage being applied immediately after the bath.

I think it very advantageous to employ these hydrotherapeutic measures in connection with massage. Cold water has been much recommended in the treatment of sprains, and has certainly been highly successful, although less rapidly curative than massage. By the combination suggested, most rapid results may be obtained, and the patient may be saved from great and prolonged suffering. 537

Muscular Rheumatism.—In muscular rheumatism, 538 pain is occasioned by use of the affected muscles. There is often also considerable loss of both motion and elasticity in the muscle. Frequently, rheumatic nodules will be found along the course of the lymphatics. Muscular rheumatism may exist alone or in connection with a like affection of the joints, as in the last-named disease the rheumatic process not infrequently extends from the joint to adjacent muscles.

Daily manipulation is essential in the treatment of muscular rheumatism. The most important procedures are friction, deep kneading, hacking, rolling, wringing, chucking, stretching, and such resistive movements as will act upon the affected muscles, together with movements of the joint acted upon by them. 539

Fomentations and heating compresses are of special value 540 in these cases. Rheumatism of the muscles, as well as of the joints, is connected with a systemic condition, or diathesis, which must also receive attention. Not infrequently—in the majority of cases, in fact—there is to be found dilatation of the stomach; and complete relief will only be obtained by a combination of local measures with such general treatment as will correct the constitutional condition, which includes careful adaptation of the diet to the state of the digestive organs, and an antiseptic regimen. Local treatment of the stomach is

essential in many cases, also general tonic and eliminative measures.

- 541 **Massage of the Breast** (Figs. 111 and 112). — The procedures in massage of the breast consist of gentle grasping, compressing, rubbing, and fulling movements, beginning at the periphery of the breast and working toward the nipple. The manipulation is very similar to that usually employed in milking. The parts should be thoroughly lubricated, and care taken to avoid so great pressure as to bruise the tissues. The manipulations should not be employed when the breast does not contain milk, as harm will thus be done rather than good. The purpose is to remove the milk from the obstructed channels in the gentlest manner possible, and thereby relieve the over-distended ducts. When hardness of the breast exists in the puerperal or nursing woman, milk is almost always present, although the patient may feel very certain to the contrary.
- 542 It is, as a rule, improper to manipulate a breast when suppuration exists. It should not be taken for granted, however, that suppuration is present because the patient has had a chill, and shows a rise of temperature, as the application of massage, even under such circumstances, will often result in resolution. But the greatest utility of massage of the breast is as a means of preventing an over-accumulation of milk, with resulting chill, fever, and suppuration. Violent or bruising manipulations, however, may result in great damage, encouraging suppuration rather than preventing it.
- 543 Manipulation of the breast is sometimes employed as a means of encouraging development of the organ, especially in cases in which the nipple is unusually small or retracted. In applying massage for this purpose, the areola should be drawn back by pressure with the thumb and forefinger until the nipple becomes prominent. It should then be seized and drawn forward, as by the action of the child's lips when nursing (Fig. 112), a pinching and rolling movement being at the same time applied. The proper time for such applications is during the later months of pregnancy. It should be remem-

bered, however, that manipulation of the breast sometimes has an exciting effect upon the pelvic organs, and any marked indication of such a result should be considered sufficient reason for discontinuing the applications. This treatment is also an excellent means of hardening the skin of the breast and the nipple, and hence is a useful precaution against soreness of the nipples from nursing.

Massage in Pregnancy.—Massage is a most valuable 544 means of preventing a variety of the most serious complications of pregnancy and parturition. A woman who is accustomed to active muscular employment during the period of gestation will not require the assistance of massage; but for those women who lead sedentary lives or who are lacking in physical development, massage affords a most excellent measure of preparation for the parturient process. Both general and local massage are of value in these cases. General massage should consist of the ordinary procedures, with this exception: Special care must be taken to avoid violent manipulations of the abdomen and too vigorous percussion of the lower portion of the back, especially at the beginning of the treatment. The “deep” procedures in massage should not be undertaken unless the masseuse has had special experience in these cases, and knows how to reach the colon without disturbing the gravid uterus. The chief aim of the manipulations should be to develop the muscles, and hence they will principally consist of fulling movements and petrissage of all the muscular structures of the abdominal wall. Lifting of the abdominal contents will also be found extremely useful in many cases, relieving the strain upon the back, and aiding in the “rising” of the uterus, which is likely to be delayed in women of feeble muscular development, resulting in many distressing pelvic symptoms.

Massage of the Perineum.—This procedure is espe- 545 cially valuable in cases of rigid perineum, and cases in which a laceration has previously occurred and has been repaired by an operation. By suitable manipulations, the parts being thoroughly lubricated, the structures of the perineum may be

rendered stronger and more elastic, so as to be able to bear a larger amount of stretching. The applications should be as follows: With the patient lying upon her side, in the left Sims's position, the operator stands facing the back, with the fingers resting upon the buttocks, and manipulates the perineum, using the thumbs in alternation, stretching the tissues away from the median line. Only one thumb should be used at once, stretching in opposite directions, as by the use of both, the stretching might be overdone and the skin irritated.

546 The patient should also be made to execute breathing movements, in which both the abdominal and the perineal muscles are vigorously contracted during the act of expiration. Under the instructions of a physician, the manipulations may be somewhat extended and varied by introducing the forefinger into the vagina or the rectum, the muscle being grasped between the forefinger and the thumb, and thoroughly pressed and stretched.

547 Neuralgic Pain.—Massage is one of the most effective means of relieving neuralgic pain. General massage acts by improving the blood and the general nutrition. Dr. Chapman has very well said that "pain is the cry of a hungry nerve for better blood." With better blood and better nutrition, the cause of neuralgic pain is usually removed. Local massage may act both as a derivative measure and as a means of directly stimulating the nutrition of the nerve itself, according as the applications are made in a derivative manner or applied directly to the nerve.

548 All the various procedures of massage may be used in the treatment of neuralgia. The most effective measures for direct application are nerve compression and vibration. Vibration may be employed either by manual or mechanical means. Mechanical vibration may be simply ordinary shaking, or what may be termed musical vibration. Musical vibrations were first employed and brought to the attention of the profession by Mortimer Granville, of London, whose "nerve percuter" the writer has had in use for some twelve

years. Dr. Granville believes that pain is due to disharmony, or morbid vibration, in a nerve, and has found in his experience that acute, sharp pain is best relieved by musical vibration of a low tone, while dull, heavy pain is best relieved by high-keyed vibrations. He thinks that relief is obtained by interruption of the discordant nerve vibrations, which he considers the cause of the pain.

Charcot claims to have obtained good results with the vibrating helmet for relief of painful head symptoms. I have not found Mortimer Granville's nerve percuter entirely satisfactory, as it is very prone to get out of order, but have obtained good results from the use of a percuter constructed by modifying Bonwell's dental engine. The writer has recently had constructed an electrical device by which vibrations may be applied directly to a nerve trunk, or to any desired point accessible from the surface of the body. (See Fig. 121.)

Writer's Cramp.—This disease, which appears under various forms, and to which different terms are applied as it occurs in writers, telegraph operators, piano players, or persons engaged in other occupations which chiefly employ the muscles of the forearm, is more amenable to massage than to any other mode of treatment. Three distinct phases are described, characterized respectively by trembling, spastic contraction of the muscles, and paralysis. All three phases of the disease are sometimes found present in a single case. This condition is largely the result of unbalanced muscular and nerve action.

The following procedures are the most effective in relieving it:—

1. Thorough kneading of the fingers and dorsal interossei (213, 274).
2. Kneading of the palm (275), especial attention being given to the fleshy masses of the palm of the hand; and rolling of the hand (Fig. 47).
3. Kneading of the forearm with very firm pressure (277).
4. Hacking (316) of forearm and arm.

5. Stretching of the finger, wrist, elbow, and shoulder joints (342, 372-376).

6. Vibration—shaking (303).

Centripetal friction, with firm pressure, should be used in alternation with the various procedures named.

552 In addition to the passive movements of massage, the patient should be directed to take special exercises. These exercises should be so directed as to bring into action the muscles which antagonize the affected muscles or those which are most employed in the exercise which has given rise to the disease. In writing, the interossei are used in such a way as to fix and steady the fingers, holding the metacarpal bones tightly together; hence these muscles should be exercised in the opposite direction, which will be accomplished by causing the patient to separate the fingers, at the same time making resistance, which may be offered by grasping the extended fingers between the thumb and forefinger, then directing the patient to spread his fingers, the pressure being carefully graduated to the condition of the muscles, and increased from time to time.

553 The patient may take the exercise by himself, making resistance with the opposite hand, or applying it by means of a rubber band slipped over the fingers. As the muscles gain in strength, a stronger band may be used, or another may be added, the number of bands being increased as the muscles gain in strength. These exercises should be taken four to eight times daily.

554 Writing exercises are also useful. These exercises should be at first chiefly confined to such letters as give the patient the greatest amount of trouble. They should begin with black-board work, or writing with a pencil in a very large hand. The purpose of this exercise is a double one; first, to gradually train the muscles to execute proper movements; and, second, to train the motor centers in the brain, which acquire a perverted habit through the long-continued morbid action of the muscles. As the muscular balance is improved, the letters are gradually decreased in size. Such letters as *l* and *n* are good

ones for practice. To these, other letters may be added later, such as *f*, *t*, *g*, and combinations of letters, as *li*, *lim*, *lo*, *log*, *fog*, *fit*, etc.

The writer has succeeded in curing some extraordinarily 555 bad cases of this kind which had previously resisted all measures of treatment, including operative procedures.

Massage in Heart Disease.— There is no condition in 556 which massage is of greater value than in the treatment of disorders of the heart. Space is lacking for a consideration here of the pathology of cardiac disease, nor is it necessary that the masseur should possess this knowledge. It is important, however, that the trained masseur should know that different forms of cardiac disease require very different, indeed actually opposite, applications of massage, so that it is quite possible to do much harm by inappropriate measures, as well as incalculable good by the skillful employment of judicious procedures. For practical purposes, the various forms of cardiac disease may be classified in relation to the indications for the application of massage, as follows : —

1. *Overaction of the heart*, due to overcompensation from 557 valvular disease, to disease of the lungs in which the respiratory field is lessened, or to hypertrophy, the result of overtraining. Excessive action of the heart is indicated by its heavy beating (not palpitation, but excessive force of beat), strong, full, and sustained pulse, and congestion of the head, often accompanied by insomnia.

2. *Weakness of the heart*, a condition resulting from dila- 558 tation from advanced valvular disease, from fatty degeneration, or from hemorrhage or long existing and exhausting disease, as a prolonged attack of fever accompanied by high temperature. Heart weakness may be recognized by the feeble, frequent pulse, easily extinguished by pressure with the finger; by the bluish, or cyanotic, appearance of the face or lips; and by the inability of the patient to exercise to any extent without quickly getting out of breath.

3. *Functional disorders of the heart*, such as palpitation 559

and intermittent or irregular beating. These troubles are, in the great majority of cases, connected with disturbances of digestion.

The treatment indicated for these conditions is as follows :—

560 *Massage for Overactive Heart.*—This condition requires, first of all, rest in bed. Massage is essential in these cases : (1) To obviate the evils which arise from long-continued rest in bed ; (2) to aid in quieting the overactive heart. For the accomplishment of the first purpose, abdominal massage should be administered daily. Moderate breathing exercises should be employed for five minutes before and after each meal, and on first awaking in the morning. The only general procedures which should be employed are stroking (169, 175) and centrifugal friction (194), the purpose being not to accelerate the circulation of the blood in the vessels, but rather to retard it. Care should be taken, even in the application of the measures named, to avoid the employment of too great a degree of force in the friction movements, as the reflex action occasioned thereby may result in giving the treatment an exciting, rather than a sedative, effect.

561 *Massage for Weak Heart.*—In cases of extreme weakness of the heart ; that is, cases in which even so small an amount of exercise as that involved in walking slowly for a short distance, cannot be taken without producing shortness of breath, the patient must first of all be put to bed. He must not be allowed to stand upon his feet at all, nor even to sit up, but must be kept in a horizontal position either in bed or on a cot, or in a reclining chair. In a case of this kind, nearly all the procedures of massage are beneficial, with the exception of centrifugal friction, which should be avoided. The measures of greatest value are centripetal friction (193), respiratory exercises (381-384), joint movements (342-376), and massage of the heart (506-509), all of which should be employed from two to four times daily. Abdominal massage (389-424) should also be applied, care being taken, however, to avoid the use of too much force, as it is not desirable to draw too

large a quantity of blood to the abdomen. In joint movements, great care must be taken not to overdo in exercising. The force employed should not be so great as to cause the patient to breathe rapidly. The slightest evidence of breathlessness or quickened respiration on the part of the patient, as shown by increased movements of the anterior nares, is an indication that the treatment has been too severe.

In order to avoid the possibility of injury from joint movements, care should be taken not to apply a movement to the same joint twice in immediate succession. Beginning with one arm, apply gentle flexion and extension, first to the wrist, then to the elbow, then rotate the shoulder joint, describing the circle but once; next proceed to the other arm, then take the opposite leg, then the other leg. Now return to the arm first treated, and so continue until each of the extremities has been gone over from two to six times. Centripetal friction should be applied to each limb immediately after the application of the movements, and before proceeding to the exercise of another part. 562

In employing the flexion and extension, care should be taken that the movement is carried to the extent of quite decided resistance, otherwise the circulation will not be excited. Flexion and extension thus applied to a joint constitute an invaluable pumping process, in which the lymphatics and vessels of first one side and then the other are alternately stretched or compressed and emptied, then relaxed and filled. 563

When the patient becomes able to bear a considerable amount of purely passive flexion and extension without excitement of the heart, the movements should be made at first slightly, and later more strongly, resistive. Resistive movements are most safely and effectively executed in these cases by having the patient first flex the joint to be operated upon, and then attempt to hold it in a flexed position while the masseur extends it; the movement is then reversed; that is, the patient extends the limb and holds it rigid while the masseur overcomes the rigidity in flexing it. Very little force should be used at first. 564

565 When sufficiently recovered to allow some exercise upon the feet, the patient may be taught to operate upon his own joints by executing flexion and extension movements without the aid of the masseur. This may be accomplished thus: Extending the limb (an arm, for example), the patient renders it rigid by contracting both the flexor and extensor muscles as forcibly as possible. Flexing the joint to the fullest extent, the flexor and extensor muscles are again brought into a state of firm rigidity by voluntary contraction. The movements should be applied in a rotating series, passing rapidly from one joint to another until all the joints of both the upper and the lower extremities have been exercised, and then repeated as directed for passive movements administered by the masseur.

566 A patient suffering from cardiac insufficiency, as is the case with other patients for whom the "rest-cure" is employed, cannot be cured in bed. The purpose of rest in bed is to restore the balance of the circulation. When this has been accomplished, as indicated by improved aëration of the blood, outwardly manifested by the disappearance of the blue color of the lips or skin, and of œdema of the face or extremities, or of dropsical accumulations in the abdomen and chest or the pericardial sac, the patient may begin to take exercise upon the feet.

The exercise must not be carried so far, however, as to cause an increase of the dropsical accumulation in the feet or the abdomen. Great care must be taken that the patient does not take such violent or long-continued exercise as to cause breathlessness, or even a decided increase in the rate of breathing. When this precaution is disregarded, the breathlessness will increase from day to day, even though the exercise be not increased, and the patient's former condition will gradually return, necessitating his again being put to bed, and the employment of the same measures as before.

567 Walking and other voluntary exercises should stop just short of a decided increase of respiratory activity, so that the heart shall not be to any degree excited. The greatest care will be

required at the beginning of exercise to avoid going beyond the safe limit.

Passive, active-passive, and voluntary exercise of the joints, 568 with the patient in a horizontal position, should be employed for half an hour after each effort of the patient to become accustomed to exercise in a vertical position, and will be found a very excellent means of quieting the heart. Among the most useful exercises in which the patient may at first engage, is the use of the treadle, which has the motion of the velocipede without the incitement to overexercise which accompanies the use of this admirable means of exercise.

By degrees the patient may be accustomed to more and 569 more severe effort, until such exercises as slowly climbing a hill of moderate grade, or a flight of stairs not too steep nor too long, may be attempted. It is only by voluntary exercise, gradually and systematically increased, that a patient suffering from cardiac insufficiency can be brought to a state in which he may be said to enjoy health, and in which he is comparatively safe from the extension of the pathological condition under which he is laboring.

That exercise is the only means by which a muscle can be strengthened is a principle which applies to the heart as well as to every other muscle of the body.

Massage for Palpitation of the Heart.— As palpitation and 570 other forms of functional disease of the heart are, in the majority of cases, due to a disturbance of the sympathetic nerve arising from some disorder of the abdominal viscera, special attention should be given to abdominal massage in this class of cases. Palpitation may arise from dilatation of the stomach and resulting indigestion, or from the dragging upon the abdominal sympathetic, due to prolapse of the stomach and bowels, a floating kidney, a prolapsed liver, or a dislocated spleen. Care should be taken to see that each viscus is in its proper position, replacement being performed by the methods previously described, when necessary. Lifting the abdominal contents is especially important, and in cases of dilatation of the stomach,

massage of the stomach must be applied in such a manner as to empty the organ of its fermenting and decomposing contents. In some instances, lavage of the stomach is essential as a preliminary measure whereby the disturbing poisonous substances may be removed. Massage of the heart (506-509) is also useful as a means of assisting the heart to acquire its normal rhythm. Massage of the stomach (451, 452) and replacement of the viscera (439-450) should be employed at least twice a day. In case the viscera are prolapsed, an abdominal bandage must be worn, being carefully applied after the viscera have been replaced. General massage is required daily.

571 Special Exercises to be Employed with Massage.

—Every masseur or masseuse ought to be skilled in gymnastics, as some of the morbid conditions which most urgently require the employment of massage are the result of deficient exercise and incorrect positions in standing and sitting. Weakness of the muscles of the trunk is the principal cause of prolapse of the abdominal and pelvic organs and of deformities of the spine, and is either directly or indirectly the cause of a great variety of functional disorders of the abdominal and pelvic organs, as well as local and general nervous maladies for which massage is frequently prescribed.

572 Massage alone is not sufficient to effect a permanent cure in these cases, for the reason that it does not remove the original cause. It is only capable of palliating or temporarily removing the consequences, and not the cause. It is necessarily of great importance that gymnastics should be combined with massage. I constantly employ manual Swedish movements, gymnastics with apparatus, Swedish educational gymnastics, and various outdoor exercises, such as bicycle riding, horse-back riding, rowing, etc., as necessary complements of massage.

BODILY SYMMETRY AND CORRECT POISE.

573 The trained manipulator should understand the importance of symmetrical development and the maintenance of correct poise when the body is in the erect position. Not a few of



Fig. 107. Incorrect Standing Position.



Fig. 108. Putting Hips Backward.



Fig. 109. Raising to Position.



Fig. 110. Correct Position

PLATE XXXVIII. Correction of Standing Pose.

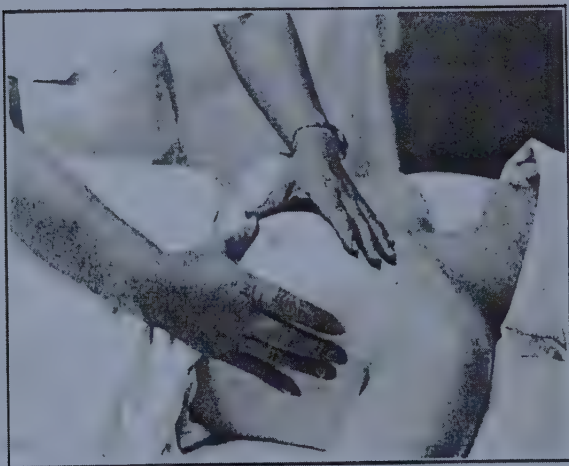


Fig. 111. Massaging of the Breast— Friction.

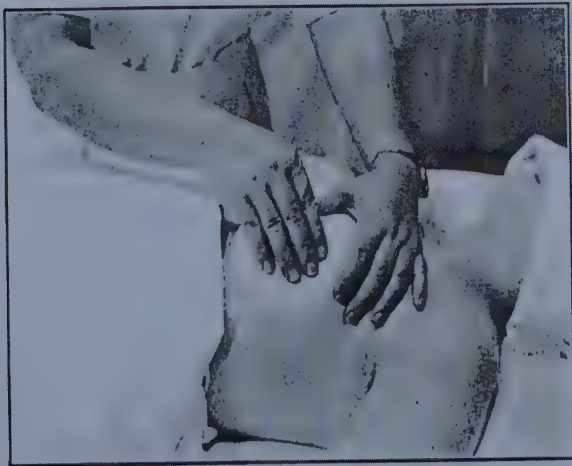


Fig. 112. Massaging of the Breast— Fulling.

the maladies for which massage is frequently administered are quite as much the result of a wrong attitude assumed in sitting as of deficient muscular development. The sedentary life to which the majority of civilized men and women are subjected, and especially the sitting posture, which, as employed by civilized man, is quite unnatural, are the immediate cause of various bodily deformities, especially contracted and rigid chest and prolapsed viscera, with wide-reaching mischiefs involving nearly every organ and structure of the body resulting from these conditions. In enteroptosis, massage of the chest and abdomen, breathing exercises, and daily replacement of the stomach, bowels, liver, kidneys, or other displaced parts, will never effect a cure unless the patient is trained to sit correctly, carrying the chest high, so that the lungs may have an opportunity for full and free movement in inspiration. When the chest is lifted high, and maintained in this position, the effect is to draw the stomach, bowels, and other viscera up into position. With each inspiratory movement, the viscera are lifted up, and the blood which is stagnating in their dilated vessels is sucked out by the diminished pressure within the chest, combined with compression of the viscera between the diaphragm and the abdominal walls.

In plates XXXIII and XXXIV are shown some asymmetrical forms often encountered, together with natural and well-developed forms, which may serve as models. These are presented for the purpose of calling the attention of the reader to the importance of making a careful study of the conformation of the body in each patient, carefully seeking out deviations from the normal, and calling the patient's attention to these defects, and assisting him to correct them by massage, manual Swedish movements, and such other measures as may be required.

Every patient should be trained in correct sitting. It is especially important that the patient should be made to appreciate what is a correct sitting attitude. This may be accomplished by the following simple method:—

Figures 1 to 5 (Plate A) illustrate a very simple method of acquiring a healthful poise. Figure 1 shows a lady sitting

in the position commonly assumed in the ordinary chair. The proper sitting poise is shown in Figure 2. By a careful study of these two figures, the difference in position maintained will be readily apparent. In Figure 1 the center of the back rests against the back of the chair, the chin drops forward, the chest is flattened, the stomach and bowels depressed, and all the muscles of the trunk relaxed. In Figure 2 the hips and shoulders touch the back of the chair, while the center portion of the back is not in contact with the chair back. The chest is held well up, the chin drawn in, the abdominal muscles and all the muscles of the trunk are contracted, and the stomach, bowels, and other organs are thus held in proper place. The position shown in Figure 1 is transformed into the correct position of Figure 2. First, the hands are placed upon the hips, as shown in Figure 3. The head is thrown backward, so that the eyes look up toward the ceiling a little more than is shown in Figure 3. The body is then bent forward, as shown in Figure 4, the head being carried well backward, while vigorous pressure is made on the back with the thumbs. The purpose of the pressure with the thumbs is to cause firm contraction of the muscles of the back. This brings the chest forward, and corrects the posterior curve of the back, which is acquired by the habit of sitting in a relaxed position, as shown in Figure 1. While making firm pressure with the thumbs, the body is raised to the correct position shown in Figure 5. The pressure with the thumbs prevents relaxation of the muscles of the trunk while the body is being raised to position. While holding the body in correct position, the hands are removed from the hips, the shoulders allowed to rest against the back of the chair, the muscles of the trunk still remaining in forcible action, and thus the position shown in Figure 2 is acquired.

The ordinary rocking chair is a recruiting agent for the undertaker. It is rare indeed to find a chair of any sort which is constructed in such a manner as to encourage a correct sitting poise. After studying this question for more than twenty-five years, the writer has had constructed a chair which he believes to embody the necessary principles for securing a correct sitting poise. The special features of this chair are a seat somewhat



1 2 3 4 5 6
7 8 9 10 11 12

PLATE A. Method of Correcting Sitting And Standing Poise

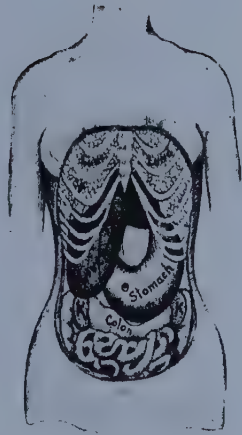
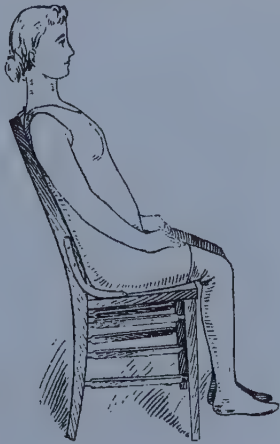


Fig. 1. Internal Organs in Proper Position. Fig. 2. Displaced Internal Organs.



**Fig. 3. Deformities Resulting from the
Straight-Back Chair.**

**Fig. 4. Correct Sitting in a
Correct Chair.**

PLATE B.

strongly inclined backward, a back curved slightly forward at the bottom and inclining backward considerably more than that of the ordinary chair. The effect of this construction is to encourage the occupant to sit well back in the chair, while the head is, by the inclination of the back, carried backward to a point which necessitates the action of the anterior muscles of the neck in supporting it. This has the effect to make an upward pull upon the upper anterior part of the chest, thus encouraging chest expansion and deep respiration. This will be readily seen in the accompanying cuts (Plates A and B), which show the effect of the ordinary chair and that of the author's physiological chair. Rocking chairs constructed upon this plan are not only comfortable, but wholly unobjectionable.

The ordinary chair can be greatly improved by cutting off the back legs half an inch or an inch, and fastening a properly shaped cushion to the back of the chair, two or three inches above the seat.

When the internal organs are crowded out of place, various evils result. They become abnormally filled with blood, and their functions are variously disturbed. The stomach, for example, can not properly discharge its contents into the intestines; the food is too long retained in the stomach, fermentation takes place, indigestion results. The fermenting and decomposing food passed into the intestines, produces disease there, and the abnormal liberation of gas distends the intestines, and constipation, hemorrhoids, intestinal catarrh, and other disorders are the consequence. The poisons generated by the long delay of the decomposed foods in the stomach and colon are carried to the liver and kidneys, and these organs likewise become disturbed. Other parts besides the liver and kidneys suffer. The brain becomes irritated. Neuralgia, confusion of thought, mental depression, nervous headache, backache, and general vital depression, are common consequences. The backache from which a large proportion of women, and many men, suffer, may be attributed, in many cases, to prolapse of the internal organs, due to a wrong position in sitting. Constipation and the numerous evil consequences which result from this condition, including anemia, neurasthenia, or nervous

prostration, autointoxication, rectal ulcer, displacement of the pelvic organs, ovarian and uterine congestion, and other pelvic disorders, are only a few of the morbid conditions which are a result of a relaxed sitting position.

The action of the lungs is also interfered with. Full and free respiration is impossible so long as the chest is depressed. The forward droop of the shoulders interferes with the raising of the ribs and proper expansion of the chest cavity. The constant relaxation of the abdominal muscles weakens that important muscle, the diaphragm, by removing the normal resistance against which it operates. The weakness of the abdominal muscles results in a corresponding weakness of the muscles of the back, so that the individual loses the ability to hold the trunk erect, even for a short time, without great weariness and inconvenience.

Nearly all persons whose occupations require them to retain for considerable periods the sitting posture, suffer from these evil consequences; hence most women are found to be suffering from prolapse of the internal organs. The stomach and bowels are nearly always found depressed in women of twenty years and upward, the downward displacement varying from two to six inches, or more. It is rare indeed to find a woman twenty-five years of age or over who has not serious displacement of important organs. Movable or floating kidneys and prolapsed stomach are exceedingly common, as well as displacement of the uterus and ovaries, from which so many civilized women suffer. Both men and women suffer from hernia, backache, neurasthenia, nervous dyspepsia, and bladder troubles, as the result of an unnatural sitting position.

A correct poise in standing and walking is almost as important as in sitting. Drooping shoulders and forward carriage of the hips are perhaps the worse faults. A correct standing poise may be easily acquired by the help of a very simple exercise when once the correct position is understood.

577 Figures 6 and 7 show incorrect and correct standing positions. The correct standing position may be readily found by a simple exercise, taken by aid of the edge of a door, or a perpendicular wall. In Figure 6 the person is shown standing



A Symmetrically Developed Man.
PLATE C.



A Symmetrically Developed Woman.
PLATE D.

with the usual incorrect poise against the edge of a door. Figures 8, 9, and 10 show how the correct standing position is obtained. Standing with the heels, hips, head, and shoulders against the edge of the door, the head is thrown backward until the chest is lifted forward, as shown in Figure 9, the heels and hips being held against the edge of the door. The hands are now put upon the hips, as shown in Figure 3. With the thumbs backward, a firm pressure is made with the ends of the thumbs. This contracts the muscles of the back so that when the head is thrown forward, the position shown in Figure 10 is found. Holding the muscles of the trunk forcibly contracted, the arms are allowed to drop by the side, and stepping free from the door, the excellent standing position shown in Figure 7 is acquired.

Exercises Correcting Poise, to be Taken in Connection with Massage.—The author has found the following series of exercises of special value:— 578

Series A.—With the patient lying upon the face, the forehead resting upon the hands, placed one above the other, take the following exercises:— 579

1. Head raising backward four times.
2. Leg raising, leg and foot extended, each four times.
3. Leg raising, both together four times.
4. Head and leg raising (Fig. 113), each leg two to four times.
5. Head and legs raising, both legs together, two to four times.

Series B.—Repeat the above exercises while lying upon back (Fig. 114). 580

Series C.—Patient lying upon back, with the heels drawn up to the body. 581

1. Hips raising (Fig. 82), two to eight times. The hips should be raised until the trunk and thighs are in line from shoulders to knees.

2. Knees separating (Fig. 71). The knees should be separated as widely as possible. Repeat four to eight times.

3. Hips-raising and knees-separating movements, thus: Sep-

arate the knees well, raise the hips, hold a few seconds, then bring the knees together while lowering the hips.

The exercises of this series are especially designed to develop those muscles which tilt the pelvis backward, thus increasing the obliquity of the pelvis, a matter of much consequence in relation to correct standing, and also with reference to uterine displacements.

582 *Series D.*—1. Fill the lungs, raising the chest as high as possible. Hold chest high while breathing out, expelling the air by strong contraction of the abdominal muscles. This raises the viscera and empties them of blood. Alternate with full breathing. The effect of this exercise is increased by placing the hands upon the hips with the thumbs and the elbows carried back as far as possible. Firm pressure should be made with the thumbs while breathing out. This prevents lowering of the chest.

2. Empty lungs. Close glottis, and raise chest, without admitting air. Repeat, alternating with full breathing.

3. Sitting on the edge of an ordinary chair, place the hands upon the hips, as directed above, raise the chest high, and execute a swinging movement of the body, lifting the feet from the floor each time the trunk moves backward. The breath should be drawn in while the trunk moves forward. Sway the trunk backward and raise the knees while holding the breath. Let the breath escape just at the end of the backward movement, and fill the lungs while bending forward. This rocking exercise should be taken several times daily, from twenty-five to fifty movements being executed each time. It is an excellent means of strengthening the abdominal muscles and training them to hold the viscera in position.

4. Walking on tiptoe with the chest carried high, breathing wholly by use of the diaphragm and the abdominal muscles, is a capital exercise for strengthening the muscles of the trunk, especially those of the abdominal region.

5. Breathing while standing against the wall with the heels, hips, shoulders, and head touching the wall, the chest being held as high as possible, is a very excellent means indeed of developing the diaphragm and the abdominal muscles.



Profile of Torso of Well-Developed
Woman



Profile of Torso of Well-Developed Man

PLATE E.

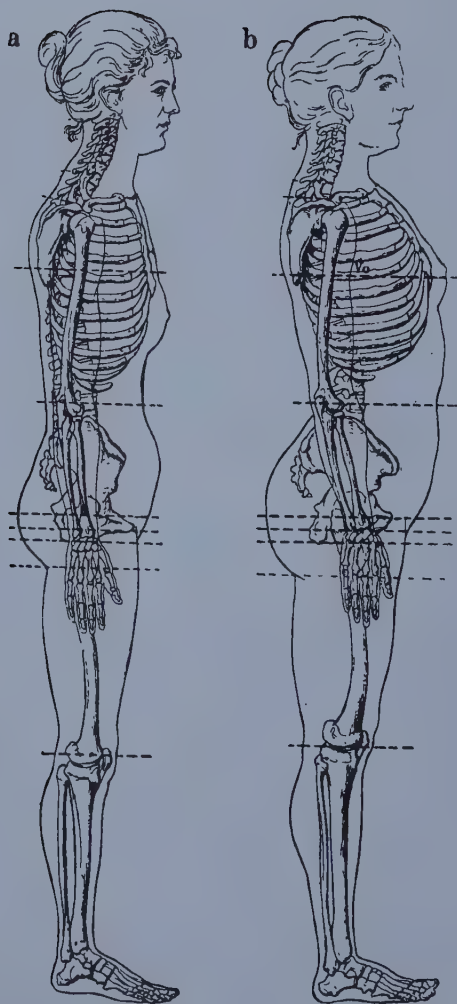


Figure Showing Contrast Between a Corset-Deformed and Well-Developed Woman.

PLATE F.

SPECIAL METHODS OF ZABLUDOWSKI AND METZGER.

The names of Metzger and Zabludowski stand prominent above all other living authorities in all that pertains to scientific massage. Though first in the field as a remarkably successful practitioner of massage, Metzger has done little or nothing for the advancement of our knowledge of the physiologic effects of manual manipulations of the body; but Zabludowski, the professor of massotherapy in the medical department of the University of Berlin, has contributed largely to the establishment of massotherapy upon a sound scientific basis.

The writer having been afforded an opportunity to study and observe the methods of applying and teaching massage in the clinic devoted to this special department, which is presided over by the amiable Professor Zabludowski, he is able to speak from personal knowledge of the great efficiency of the methods employed, and it is the purpose of this chapter to add a brief description of some of the special features which have been found useful in connection with the methods which have been elsewhere described in this work.

The special characteristics of Zabludowski's work are great thoroughness and the speedy accomplishment of results. Zabludowski, although a most enthusiastic specialist, nevertheless does not claim massage to be a panacea. While he makes use of no other measures whatever in the treatment of his patients, he does not undertake to cure every malady by this means alone, but occasionally refuses to take patients whom he deems unsuited to manual treatment. The special methods which the writer considers of greatest value, and which are employed by both Zabludowski and Metzger, are the following:—

Grasping Kneading.—A method of deep kneading, designated as wringing, is elsewhere described in this work. An excellent modification of this method employed by Zabludowski

dowski is administered as follows to the leg: The manipulator stands facing the patient. (Plate G.) Both hands grasp the limb close to the foot. The hand nearest the foot is carried over as far as possible. Then, firmly grasping the limb, the soft tissues are moved on the bones as the hand is drawn over toward the manipulator. While this movement is being executed by one hand, the other hand moves in the opposite direction, so that when the hand first set to work relaxes its grasp, the other hand is just grasping the limb. With this grasping and twisting movement, the hands, working in alternation, move up the limb from the ankle to the upper parts of the thighs. While the masseur stands on one side, he manipulates the inside of the leg nearest to him, and the outside of the other leg; then stepping to the other side of the couch, or after the patient turns over, he executes the same movements, thus completing the work on the lower extremities. The arms are treated in a similar manner.

Abdominal Kneading.—Zabludowski's method (Plate H.) of abdominal kneading is simple and effective. The movements consist almost exclusively of alternate movements of the two hands, pressure being made first with the heel of the hand, then with the fingers. In beginning, the two hands are placed upon the abdomen, one above the umbilicus, the other below this point. The right hand is first put in action, firm pressure being made with the ball of the thumb and the heel of the hand until the median line is reached. Then the pressure is transferred to the palmar surface of the fingers, upon which firm pressure is made, care being taken to avoid pressure with the finger tips, which is painful. This movement is executed four to eight times; then the same movements are made with the other hand. Next the two hands are made to work in alternation. Then both hands work together in the same direction. Next the same movements are executed in a semicircular way, each hand describing about a third of a circle, one below the umbilicus, the other above the umbilicus. Pressure is then made the whole length of the colon, beginning at the lower end of the cecum, and following the colon around from right to left with the left hand, while re-enforcing pressure is made with the right hand placed upon it.

The manipulator now changes his position, and with his right side turned toward the patient's right, and facing the head of the patient, he places his hands upon the abdomen, parallel with the axis of the patient's body, the right hand to the left of the umbilicus, the left hand to the right, the palms of the hands resting upon the lower abdomen just above the pubes. The same movements are now executed as before.

The patient is now made to turn upon the left side, and while he lies in this position, the transverse movements first described are executed. He then turns upon the right side, and the manipulator kneels upon a low stool beside him, and repeats the same transverse movements.

There are several reasons for the application of these movements in these several positions. A change of position is agreeable to the patient. Second, the manipulations reach in a more thorough-going manner all parts of the abdominal contents. Third, the work is less wearisome to the manipulator.

If accumulations of fecal matter are found in any portion of the colon, special kneading movements are applied for the purpose of breaking them up. Zabłudowski does not believe that abdominal massage to any considerable extent mechanically removes the intestinal contents. The chief effects produced are the breaking up of impactions and stimulation of peristalsis by means of which the stagnating contents may be moved downward and discharged.

Abdominal massage is always terminated by making the patient breathe very deeply while the attendant makes firm pressure on the abdomen with both hands. The effect of this is to drive the blood out of the abdomen into the general circulation, thus raising general blood-pressure while relieving visceral congestion.

Rhythmical Manipulations. — Zabłudowski lays special stress upon executing movements in a rhythmical way. Prolonged manipulations of parts for the purpose of removing exudations are chiefly executed with the ball of the thumb, the hand being placed upon the part in the manner indicated in the accompanying cut. (Plate H.) Pressure is made in one direction only, the hand being drawn back with a double pat-

ting movement. The rate is about two to the second, the count being, one, two and,— one, two and,— in two-four time. The effect of this mode of manipulation is very pleasant, indeed. It is commonly continued from three to ten minutes, or until decided effects have been produced. In applications made to the wrist, the hand of the patient rests upon a stand of convenient height, so that firm pressure may be made. The same manipulations may be applied to the ankle, the hand, the groin in chronic appendicitis, to the hypogastrium in cases of chronic passive congestion of the pelvic viscera, to the elbow, knee, shoulder, and parts in which fractures or dislocations have occurred, leaving behind stiffness, soreness, or exudates.

Friction.— Much attention is given by Zabludowski to friction movements to the back. The movement is made in one direction only, usually from below upward. Both hands are employed, and as they are pushed from below upward, an alternate lateral movement is executed, thus diminishing the traction upon the skin, and facilitating the upward movement with the hand. This is especially important in the case of patients in whom there is an unusually luxuriant growth of hair.

The writer's method of applying friction to the extremities is the following: The manipulator stands with the right side to the patient's right, and near the patient's feet. The left foot is placed a little in advance of the right. The right hand is placed upon the inner surface of the limb, close to the ankle, and in such a way as to grasp it as completely as possible. The hand is then carried with a firm movement as high as the knee. It is then slipped around under the knee so as to make pressure upon the large blood-vessels underneath the knee, and to avoid unpleasant pressure of the thumb upon the knee-cap. As soon as the knee is passed, the thumb is allowed to glide back to the front of the leg, and the hand is carried upward along the inside of the thigh to within three or four inches of the perineum. By a movement at the wrist the hand is then swept around until it lies parallel with the limb, the fingers upward. Then the hand is pushed on up to a point just above Poupart's

ligament, firm pressure being made with the heel of the hand over the femoral vein. By this means the large veins which lie just beneath the skin are emptied in the most thorough manner possible. After three or four movements made with the right hand upon the inner surface of the limb, the left hand executes similar movements upon the outer surface.

The arms are treated in a similar manner. The patient is then made to turn over, and in a similar way the back of the legs, the back, and the buttocks are treated.

It is important for the manipulator to give attention to the position of his body. The arms are held straight and rigid during the movements. The back is not bent as the arm is carried upward, but the body is carried forward by bending at the hips and by slightly bending the knee of the advanced limb. By a little practise this method is easily acquired, and it is found to be very effective. The work is chiefly done by the weight of the body. There is thus an enormous saving of muscular effort both for the arms and the back, while much stronger pressure is brought to bear upon the patient than would be possible by any other means. (Plate G.)

Rhythm in Percussion.—All movements, whether kneading, friction, or percussion, should be applied in perfect time and tune. No false moves should be made; no discordant notes should spoil the harmony. Percussion movements should be made with an even, regular rhythm. The movement and rhythm may be varied in various ways, especially by change of time and accent. A very effective variation is to make two movements of the right hand to one with the left hand. This gives the effect of exceedingly rapid movements. Slow, heavy movements may be made with one hand, preferably the left, for example, and lighter movements at twice the rate with the other. This variation is easily executed by raising the left hand two or three times as high as the other. This movement should always be executed with a flexible wrist, so that the tissues will not be bruised, and to avoid an unpleasant jarring effect.

The above suggestions will, I feel sure, be found helpful by

those who will take pains to perfect themselves in the measures which have been briefly described.

Order of Movements in General Massage.— The following order is followed at the Battle Creek Sanitarium, in what is commonly known as "Battle Creek Massage," and may be found useful by those who have not had the advantage of instruction by a skilled manipulator trained at Battle Creek, and who desire to use in a systematic way the methods described in this volume:—

THE ARM.

1. Lubricate from hand to shoulder twice, coming down with four rotary sweeps.
2. Deep kneading to hand and fingers.
3. Friction from hand to shoulder four times.
4. Deep kneading from wrist to shoulder four times.
5. Friction from hand to shoulder four times.
6. Grasping kneading from foot to body four times.
7. Percussion, hacking, spatting, and beating.
8. Friction from hand to shoulder four times.
9. Joint movements, flexion and extension, circumduction.
10. Vibration.

THE LEG.

1. Lubricate from foot to body twice, coming down with four rotary sweeps.
2. Foot Friction to bottom of foot four times. Friction to top four times. Knead foot well. Rotate ankle joint.
3. Friction from foot to body with both hands four times.
4. Deep kneading from foot to body four times.
6. Grasping kneading from foot to body four times.
7. Percussion to feet, and hacking, spatting, beating, and clapping to thighs.
8. Friction from foot to body four times.
9. Joint movements, flexion and extension, circumduction.
10. Vibration.



Application of Friction to the Extremities (Author's Method).



Grasping Kneading (Zabludowski's Method).

PLATE G.



Massage of the Wrist



Palmar Kneading of the Abdomen.

PLATE H.

THE CHEST.

1. Preliminary deep breathing.
2. Friction back of ears and to sides of neck, four passes.
3. Friction from lower end of sternum upward over shoulder to elbow, and from elbow along inner surface of arm across axilla and sides to sternum. The patient lies with hand under head.
4. Circular friction and palm kneading over pectorals.
5. Friction same as 3.
6. Friction and compression over lower chest, with breathing.
7. Percussion, tapping, hacking, and spatting.
8. Stroking.

THE ABDOMEN.

1. Preliminary deep breathing, chest lifting.
2. Abdominal lifting four times with both hands.
3. Reflex stroking to abdomen.
4. a. Palm kneading with right hand four times.
b. Palm kneading with left hand four times.
c. Alternate four times.
5. Palm kneading of colon, two to six times.
6. Repeat with patient lying on right side.
7. Repeat with patient lying on left side.
8. Deep kneading down and up each side twice.
9. Shaking and vibration.
10. Nerve compression.
11. Percussion, hacking, spatting, beating, and clapping. (Give special attention to the liver and spleen.)
12. Stroking.

THE BACK OF THE LEGS.

1. Friction from foot to body four times, both hands.
2. Deep grasping kneading four times.
3. Friction from foot to body four times.
4. Percussion to feet, hacking, spatting, beating, and clapping to thighs.
5. Friction.

THE HIPS.

1. Friction with both hands four times, alternate and circular.
2. Petrissage twice.
3. Friction with both hands four times.
4. Palm kneading twice.
5. Friction with both hands four times.
6. Vibration and shaking.
7. Percussion, hacking, spitting, beating, and clapping.
8. Stroking.

THE BACK.

1. Friction, from below up.
 2. Petrissage down each side twice.
 3. Friction.
 4. Muscle-grasping up and down back.
 5. Palm kneading down spine twice.
 6. Digital friction down spine twice (reinforced).
 7. Transverse palm kneading up and down spine.
 8. Vibration down spine.
 9. Percussion, hacking, spitting, beating, and slapping.
 10. Stroking.
- The time required for the above is thirty to forty minutes.

THE "REST-CURE."

The importance of rest as a therapeutic means in the treatment of certain forms of disease and morbid conditions, especially in surgical cases, has long been recognized by scientific physicians; but it is only within recent times that this most important of nature's various recuperative agents has been systematically studied, and a method of treatment organized to which the term "rest-cure" could be appropriately applied. Mitchell was not the first, however, to present the subject in a methodical form. John Hilton, president of the Royal College of Surgeons, of England, had, long before, dwelt with much emphasis upon the importance of rest in the treatment of disease, and devoted a volume of considerable size to its proper employment in painful maladies. It must be granted, however, that Dr. Mitchell was the first to conceive a systematic treatment by rest combined with massage and a regulated regimen, a fact which has received world-wide recognition by the medical profession.

As a therapeutic agent, rest belongs in the category of natural agents, with exercise, diet, baths, etc. It is perhaps for this reason that it was so long neglected, as were also dietetics and hydrotherapy, which have only recently begun to receive the attention that their importance demands. Sleep, nature's great restorative, is the most powerful of all recuperative measures, for the reason that during sound sleep the nearest possible approach to perfect physiological and mechanical rest is secured. Rest, even during sleep, is not absolute; otherwise the life processes would cease, and death ensue. The advantages of the rest afforded by sleep are illustrated by many facts.

Both plants and animals require physiological rest. During its waking hours, which usually correspond to those of day-

light, the animal expends energy in muscular and nervous activity. It gathers its food at the cost of more or less exertion, and otherwise exercises its powers in providing for its individual comfort or that of others. During sleep these expenditures cease, and the energies of the body may be solely employed in the repair of the injuries and losses which have occurred during the hours of waking activity. It is during sleep, when the force of the vital powers is thus concentrated upon the organism itself, that both animals and plants make the principal part of their growth.

Physiological and mechanical rest has long been known to be the best means of promoting recovery in cases of injury, and it is equally valuable in recruiting depleted vital energies or in repairing a breach in the continuity of the tissues. In cold climates, trees and plants take physiological rest during the winter months; while in warm countries a similar rest is afforded by the dry season. The water-lily of Egypt flourishes in the canals during the wet season, when they are filled with water for irrigating purposes, but disappears utterly during the dry season, when the canals are empty, and their beds so dry and hard as to be used for roadways. When the floods come down the Nile, and the water flows into the canals, the lily, recuperated by its rest, blooms again. During the brief summer season of the Arctic regions, flowers and plants spring up after their long sleep, and attain maturity in a shorter period than in any other part of the world.

Another evidence of the universal necessity for rest is afforded by the fact that plants while in bloom, in many instances exhibit evidences of sleep very similar to those shown by animals, closing their leaves or their flowers when the sun approaches the western horizon.

Growth and exercise are in opposing relation to each other. It is true that exercise promotes growth, but the growth does not occur simultaneously with the exercise. On the contrary, during periods of vigorous exercise, growth is checked. Increased oxygenation and improved elimination resulting from

exercise are means of systematic invigoration which promote growth, provided the exercise be not carried to an extreme. By too great exhaustion of the bodily forces, growth is lessened.

In the child, growth may be said to be chiefly confined to periods of rest and sleep. The full development of the body having been obtained, repair takes the place of growth. Incessant activity, which must necessarily be accompanied by the loss of sleep, produces a rapid waste of tissue, as well as anæmia from a diminution both in the number of corpuscles and in the hæmoglobin, or coloring matter, of the blood. Sleep promotes tissue production and repair.

Rest is necessary for the viscera as well as for the brain, the nerves, and the muscles. A viscus, as the liver or spleen, when at work, increases in size, from the unusual amount of blood circulating through its vessels. The diameter of the liver increases during digestion from half an inch to an inch. It is for this reason that the spongy viscera of the abdomen are each surrounded by an elastic capsule, which contains both muscular and yellow elastic fibers. The pressure of this elastic covering, constantly acting upon the organ, promotes its return to a state of physiological rest as soon as the demand for its activity has ceased.

Even the brain enlarges during activity. The thick skull does not permit an actual increase in the volume of the brain as a whole, but nature has provided an arrangement by which an enlargement of the active parts may occur. The large lateral ventricles which occupy the interior of the brain on each side are constantly filled with cerebro-spinal fluid. The optic thalami and the corpora striata, the most active portions of the brain, are so placed that they project into the ventricles. When distended with blood, and thus enlarged, as they are during activity, these bodies project farther into the ventricles, displacing a quantity of the cerebro-spinal fluid, which passes through the foramen of Monroe, the third ventricle, the aqueduct of Silvius, the fourth ventricle, the cerebro-spinal opening

in the floor of the fourth ventricle, and the sub-cerebral spaces, into the vertebral canal. When the activity ceases, the pressure of the cerebro-spinal fluid causes it to return to the lateral ventricles, thus keeping them constantly filled, and providing suitable support for the blood vessels of the adjacent nerve structures. It has been shown that when the cerebro-spinal fluid is not present in the lateral ventricles, the brain cannot be injected without rupture of these vessels.

The rhythmical activity of the chest is another means of securing the return of the brain and the viscera to a state of rest after activity. The diminution in pressure which occurs during inspiration makes a strong draught upon the blood current in the direction of the heart, thus aiding especially the venous circulation of the brain and also that of the liver, as well as that of the other abdominal viscera.

Indications for Application of the "Rest-Cure."

—More than twenty years' experience in the employment of the "rest-cure" in various forms has to the author amply demonstrated its value. It has been found especially successful in the treatment of the following conditions :—

Chronic Pain.—The rational treatment of painful maladies necessarily includes not only the recognition and treatment of the cause of the malady, but also mitigation of the pain itself, in consequence of the exhausting influence of long-continued pain, and the interference of this symptom with the normal processes of recuperation and repair. Rest and position are, in suitable cases, more effective in securing relief from pain than any of the ordinary sedative drugs, without rest. This is true of both local and general pains. The terrible pain of a felon may not infrequently be relieved to an astonishing degree by simply elevating the hand above the head. The pain of a rheumatic ankle sometimes disappears almost instantly upon the sufferer's assuming a horizontal position, with the foot elevated. The pain of an inflamed nerve, as in sciatica, yields to prolonged rest more certainly than to any other treatment. The neurotic young woman who in an erect position suffers

such intolerable spinal pain as to make existence almost unendurable, finds herself perfectly comfortable when in bed. Pelvic and abdominal pains often disappear as if by magic when the patient assumes a horizontal position. The relief thus afforded is often brought about by the removal of the tension upon the abdominal sympathetic nerve and its branches, which is secured by a reclining position.

In a majority of cases of this kind, some of the abdominal or pelvic viscera will be found displaced, or in a condition termed by Glenard "enteroptosis." When the patient is in an erect position, the stomach, liver, kidney, bowels,—one or all of these organs,—being in a pendant or floating condition drag upon the sympathetic in a way which may set up pain and morbid symptoms of the most varied character, and in structures either near or remote. Pain attributable to irritation of the abdominal sympathetic from the cause mentioned, may be locally expressed in any part of the body from the heel to the top of the head. Rest in bed is a sovereign remedy for cases of this kind.

Emaciation.—Progressive wasting of the tissues as indicated by a steady loss of flesh, is a morbid condition which sometimes proves most refractory to therapeutic efforts, especially when the means employed are exclusively of a medicinal character. There is, in fact, no drug which can be relied upon to secure a substantial and permanent increase in flesh. Emaciation is an evidence of a serious disturbance of nutrition; and when considerable in degree, or rapidly progressive, invariably demands a prompt and systematic application of the "rest-cure." An improvement in weight can be expected only as the result of an increase of residual tissue, or fat. This requires, first of all, an improvement in digestive activity, which may involve an increase in either the quantity or the quality of the digestive work done. Not infrequently, patients complain that, although they have a good appetite, and eat large quantities of food, they nevertheless steadily lose in

flesh. In these cases, a thorough-going examination of the stomach fluid obtained after a test meal, shows the coefficient of digestive activity to be low,—in other words, the quality of the digestive products is so poor that they are, in large part, useless for the purposes of nutrition.

Successful treatment of these cases requires, next after an improvement in digestion by which a larger amount of tissue-building material can be taken in, a careful economizing of the vital resources. As far as possible, the activity of the bodily powers must be concentrated upon the building up of the individual. All external expenditures of energy must be cut off.

Food is consumed in the body in three ways only—for heat production, force production, and tissue building. The food elements consumed in heat and force production cannot be deposited as tissue, or, at least, cannot be retained; consequently the amount of nutritive material used in this way should be limited to the smallest amount possible. In no way can the vital resources be thus economized so effectively as by the aid of the “rest-cure.”

Fever.—In all cases in which there is any considerable rise of temperature or febrile activity, from whatever cause, rest is one of the most essential features of treatment. If the temperature rises daily three or four degrees above normal, the patient should be kept in bed. If the elevation of temperature is not more than one or two degrees, the patient may spend a part of the time only, in bed; the balance of the time he may be dressed, if he desires, but should recline upon a cot, rolling-chair, or hammock. In this way the great waste of tissue which always accompanies fever may be very materially lessened, and the intensity of the febrile action greatly diminished. Rest in bed is one of the most valuable of all the means which can be utilized in the treatment of pulmonary tuberculosis, or consumption, during febrile paroxysms.

The necessity of rest is well recognized in the treatment of typhoid fever and other acute febrile maladies, but its impor-

tance in the treatment of pulmonary consumption is often overlooked. In the last-named disease the patient should be put to bed whenever the temperature rises above 101°.

Neurasthenia.—This condition, commonly called nervous exhaustion, is one in which the "rest-cure" has achieved some of its most important and remarkable triumphs. The value of the "rest-cure" in the treatment of neurasthenia has come to be so thoroughly recognized that it is by some considered almost a panacea. This view is an extreme one; nevertheless, mechanical and, as far as possible, physiological rest of the brain and nerves is, for many cases of this kind, most important as a requisite for recovery. This is especially true of those cases of nervous exhaustion sometimes encountered in young men and women who have led aimless and idle lives, and whose morbid condition is the result of a mental and physical stagnation rather than excessive work. In the case of overworked and worried persons, especially those in whom the decline of health has been accompanied by a loss in flesh, the "rest-cure" is indicated as a therapeutic measure of the first importance.

The Opium, Cocaine, Whisky, and Tobacco Habits.—In the treatment of these poison habits I have found rest a most valuable accessory means. The man or woman who has long been addicted to such a habit will invariably be found in a state of nerve exhaustion, and it is this condition of the nervous system, and the veritable cyclone of nerve symptoms which arises from it as soon as the toxic agent is withdrawn, so that the patient becomes conscious of his real condition, which renders the management of these cases so difficult. A person habituated to the use of any poison cannot be considered cured until the nervous system has been restored to a normal and well-balanced state. If the drug is simply withdrawn, and the patient left with a nervous system shattered by its pernicious influence, he will, in a majority of cases, find himself utterly unable to resist the importunities of his worn-out and pain-racked nerves for their accustomed solace. The morbid condition which con-

stitutes an ever-present incitement to the perpetuation of the habit must be removed before the patient can be regarded as cured. "Rest-cure" is as valuable in the treatment of this form of nervous exhaustion as any other.

Another very important reason for the employment of the "rest-cure" in these cases is the absolute control of the patient which it secures. The patient who has been long accustomed to the use of opium or cocaine, and even in some instances alcohol or tobacco habitués, require every possible assistance in getting through the first few days after the complete withdrawal of the accustomed drug, whether it is gradually taken away or suspended at once. In order to receive all the assistance possible from a rational system of treatment and by the aid of a trained nurse, the patient must remain in bed; for during this period he will require an application of some sort not only every hour but almost every moment, to quiet his clamoring nerves, as well as to while away the weary hours and beguile his mind into a normal channel. I have found the "rest-cure" of great value in the treatment of a large number of cases of the opium habit and other forms of drug addiction.

Gastric Ulcer.—In this disease, there is not only marked wasting of the body in a majority of cases, in consequence of the disturbance of nutrition occasioned both by the ulcer itself and by the morbid condition of the stomach which precedes it, but there is also a local destruction of tissue, which is aggravated by exercise. The irritability of the stomach and the highly excited state of the solar plexus render exercise upon the feet, in many of these cases, extremely painful, such exercise often giving rise to most distressing paroxysms of pain and gastric crises. By rest in bed, the patient's forces are economized; nutrition is improved; and more favorable conditions for recovery are secured.

Gastric ulcer is usually a consequence of long-continued hyperpepsia. Exercise upon the feet has a marked tendency to increase the hyperpepsia, and thus promote the development of the ulceration; while mechanical rest has an opposite effect

In most of these cases it is also necessary to give the stomach complete physiological rest by withholding altogether the administration of food by the mouth, and administering only specially prepared foods by means of the rectum. While the nutrition is thus restricted, absolute rest in bed is most important as a means of preserving the forces of the patient.

Hæmorrhage.—After severe hæmorrhage from any cause, as from the lungs in pulmonary disease; from the uterus in cases of fibroid tumor or other diseases of that organ; from the rectum, in consequence of ulceration or bleeding hemorrhoids; or from any other cause whatever, a more or less prolonged rest in bed is of the utmost importance as a therapeutic measure, and is in the highest degree conducive to the replenishment of the blood. In a number of cases of this kind the writer has noticed, during rest, an astonishingly rapid restoration of the hæmoglobin and a return of the normal blood count.

Diseases Peculiar to Women.—While many diseases peculiar to women are the result of neglect to properly develop the muscles, especially those of the trunk, nevertheless, in a large number of the morbid conditions from which they suffer, a short course of "rest-cure" may be employed with very great advantage. This is especially true in all inflammatory diseases of the ovaries and uterus. Severe cases of uterine and vaginal catarrh are also greatly benefited by rest in a recumbent position. The effect of position upon the circulation of dependent parts is readily shown by noticing the change which occurs in the circulation of the hand when lifted above the head from the usual position by the side. If the veins are much swollen, as is likely to be the case when the arm swings by the side, it will be observed that instantly, when the hand is raised above the head, or even to the horizontal position, the fullness disappears, and the skin of the hand becomes blanched. This is not simply the result of gravity acting upon the blood, but is due chiefly to a decided contraction of the blood vessels in the hand. A like change occurs in the pelvic viscera. The swollen state of the blood vessels induced by the vertical posi-

tion must greatly aggravate any pathological condition of the uterus or its appendages when congestion, either active or passive, is a prominent feature of the morbid state. The writer has frequently been told by patients that vaginal or uterine catarrh was always greatly increased during or after exercise upon the feet, and has seen such discharges disappear entirely during prolonged rest in bed, evidently as the result of the diminished circulation secured by the recumbent position.

Prostatic and Bladder Disease.—The remarks which have been made with reference to diseases peculiar to women are equally true with reference to acute disease of the bladder, urethra, prostate gland, or the genital glands, in men. An acute cystitis, urethritis, or prostatitis will be more readily benefited by rest in bed than by the employment of any other means. The same must also be said of orchitis, a disease which not infrequently resists treatment with great obstinacy, without the advantage of the recumbent position. In many cases of chronic disease of the bladder, in both men and women, "rest-cure" is of paramount importance as a therapeutic measure.

Bright's Disease of the Kidneys.—The various pathological conditions of the kidney included under the term "Bright's disease" not infrequently demand rest in bed as a necessary condition for a cure of the disease, or even an arrest of its progress. This is especially true of acute inflammation of the kidneys. In this disease there is a lessened ability of the kidney to eliminate poisons; consequently, the disintegration of tissue which occurs as the result of exercise upon the feet necessitates increased eliminative work on the part of the kidney. Exercise on the feet, and even sitting or standing, also involves greater activity of the heart and a higher arterial tension. An abnormal increase in arterial tension may be, in itself, sufficient to cause the appearance of albumen in the urine. It is evident, then, that in cases of acute inflammation of the kidneys, whatever tends to increase the arterial tension must aggravate the disease; and, on the other hand, the les-

sened arterial tension induced by rest in a horizontal position must favor recovery. In a somewhat extended experience in the treatment of this disease, the author has found rest an exceedingly valuable accessory.

Disease of the Heart.—In the history of a case of organic disease of the heart, the first morbid condition of grave character which requires the attention of the physician, is often over-compensation. The unusual amount of work required of the organ induces an excessive development of the heart muscle, and this excessive cardiac activity results in a variety of disturbing and often alarming symptoms. There is no way by which the heart's action can be so quickly and so safely quieted as by means of rest in the recumbent position. There is no drug which is, even in a small degree, a substitute for rest, in cases of this kind.

In cases of cardiac insufficiency, rest in bed is equally as valuable as in cardiac hypertrophy with overaction of the heart. When the heart has become so weak as to be unable to maintain the circulation, the relief from work afforded by rest in the horizontal position enables the heart to recover itself, so that, after a few days or weeks, as the case may require, the normal balance of the circulation is re-established; the heart, no longer distended and embarrassed with blood from which it has lost the power to empty itself, recovers its tone; the pulse becomes fuller and stronger; the cyanosis disappears; the swollen limbs return to their normal size; and the respiration is no longer embarrassed.

Nervous or Mental Irritability or Excitability.—For certain cases of extreme nervous or mental excitability bordering on acute mania, and especially in cases of acute maniacal excitement, rest in bed, accompanied by appropriate treatment, is a measure of such great advantage that I should feel very loth indeed to undertake the treatment of cases of this sort without its aid. Rest in the horizontal position not only lessens the waste of tissue resulting from abnormal nervous or mental excitement, but secures to the patient the isolation and quiet

which may exercise in a high degree a calming influence upon his over-excited nerves.

The Significance of Pain.—In the selection of cases to which the “rest-cure” should be applied, it is necessary to understand clearly the significance of pain. Not infrequently the pain experienced is very remote from the part which is the real origin of the pain, and to which, accordingly, the therapeutic measures should be directed.

In the employment of the “rest-cure” as a means of relieving pain, it is very important to distinguish between pains which are purely local in character, and those which are of reflex origin. Local pains, or those originating in the parts where they are felt, if involving but a small portion of the body, may require rest only of the part itself. But sympathetic, or reflex, pains generally require complete rest. This is true, for example, of the intercostal pains connected with pleurisy, either acute or chronic, or adhesions of the pleura resulting from inflammation. The pleura and the overlying tissues are supplied with branches from the same sensory nerves. This fact should always be kept in mind, and should lead to a careful examination of the lungs in cases in which thoracic pains are experienced.

Quite a large proportion of all external pains are connected with disease of the viscera. Pain between the shoulders or above the lower angles of the scapulæ, a very common chronic pain, indicates some disturbance of the fourth, fifth, and sixth spinal nerves. The nerve centers from which these nerves originate are those which chiefly give rise to the great splanchnic, or visceral, nerve, which is distributed to the stomach, liver, pancreas, and intestines. Its branches are also closely interwoven with the solar plexus and the lumbar ganglia of the sympathetic. It is consequently clear that the pain described may readily be produced by disease of the stomach, intestines, pancreas, liver, or some other viscus; and a careful investigation will usually show a prolapsed stomach or liver, a floating kidney, sagging of the bowels, or several of these conditions

associated, whereby an abnormal and nerve-irritating condition is induced, affecting the branches of both the sympathetic and the splanchnics.

One-sided pain, is, as a rule, an indication of a one-sided disease, while bilateral pain indicates a morbid condition affecting both sides. Even in cases arising from disturbance of the viscera, this rule holds good more frequently than might be expected. Migraine affecting one side of the head is, in the experience of the author, frequently connected with extreme hyperæsthesia of the lumbar ganglion of the same side. If both ganglia are affected, the patient will say that the attacks occur simultaneously upon both sides, or extend from one side to the other. In these cases, the greatest tenderness will usually be found in the lumbar ganglion of the side upon which the pain first begins. In cases in which the attack begins in the back of the head, extending thence upward over the whole head, both ganglia are usually found equally affected. In cases of pain arising from visceral disease, rest in bed for a week or two at the beginning of the treatment is a measure of very great advantage. At the conclusion of the period of confinement in bed, care should be taken to keep the organs in position by a properly adjusted supporter and appropriate applications of abdominal massage.

Disadvantages of the "Rest-cure."—It should never be forgotten that rest in bed involves certain disadvantages, against which careful provision must be made. Man is naturally an active animal; and habits of regular, systematic exercise are essential to the maintenance of the integrity of the vital functions. Absolute rest in bed, without the employment of proper preventive measures, is, in itself, sufficient in many cases to provoke grave morbid conditions. The muscles, of course, rapidly deteriorate under the influence of inaction, but this is a matter of small importance compared with the injury sustained by the liver and other viscera. It is a common observation in surgical wards and hospitals that a healthy man confined in bed from fracture of a limb, becomes bilious, some-

times even jaundiced, in consequence of interference with the functions of the stomach, liver, and bowels. The unpleasant effects of rest are readily understood when the important influence of exercise upon the viscera is recognized.

Exercise necessarily involves increased chest activity. The lungs constitute not only an air pump by which oxygen is supplied to the body, but, at the same time, exercise a most important influence in assisting the circulation and thus the functional activity of the stomach and liver.

The diaphragm not only acts as a great lymph pump, but by compression of the stomach and liver during the act of forcible inspiration, it exercises these important organs, and by promoting absorption, aids in emptying the stomach of its contents; while, by mechanical compression, it empties the liver of bile, and hastens the passage of the blood through its capillaries.

Perhaps more important still is the effect of exercise upon the general system in promoting the complete oxidation, or burning up, of the waste matters which are continually accumulating in the tissues through increased absorption of oxygen, and by draining off the poisonous waste substances prepared for removal from the body, and hastening their transportation to the liver, kidneys, lungs, bowels, and skin, through which they make their exit from the body. Diminished respiratory activity alone may be responsible for a congestion of the stomach and liver resulting in stomach and intestinal catarrh, infectious jaundice, and inactivity of the liver and bowels.

The horizontal position may also result in injury on account of the congestion due to the mechanical accumulation of blood in the dependent parts. Pneumonia not infrequently results from lying continuously upon the back during a course of typhoid fever or some other disabling malady. Even cerebral congestion may result from the horizontal position.

These and other disorders, the nature of which may be inferred from what has been said in reference to the influence of rest in producing these morbid conditions, may be prevented

by the adoption of proper measures, the most important of which are massage and manual Swedish movements. The utility of massage in these cases need not be argued, as it is apparent at once that it may be made, to a very large extent, a substitute for exercise, without expending the nervous energy of the patient, or making any large draughts upon his vital resources.

These facts give massage a value which cannot be overestimated. It is a means by which the patient may receive the benefit of exercise without effort on his part; and in most cases in which "rest-cure" is required, massage must also be employed as a complementary measure. A few exceptions only need be made. These are so important, however, that they must not be overlooked. First of all, it must be remembered that in febrile conditions, or at least in all cases in which any considerable degree of febrile activity exists, massage must not be applied, for the reason that it increases heat production. In most cases, bathing and rubbing must be employed to a greater or less extent; but care should be taken to avoid all manipulative measures except stroking and centrifugal friction, the tendency of which, as regards heat production, is the opposite of all the other processes of massage. In the employment of the "rest-cure" for the relief of pain due to visceral prolapse or other diseases of those organs, manipulation of the diseased viscera must be avoided except so far as may be necessary for replacement; but massage to the limbs and other parts of the body may very wisely be employed, since, when administered in this manner, it operates most efficiently as a derivative measure.

In acute Bright's disease of the kidneys, massage must be avoided, or at least should be confined to the gentlest measures, for the reason that the kidneys are crippled, and it is desirable that their work should be restricted as much as possible within safe limits. A vigorous application of massage may suddenly throw into the circulation so large a quantity of toxic and excrementitious substances as to overwhelm the kidneys and create

an increase of irritation, the result of which might be disastrous. Stroking (169-190) and centrifugal friction are the only appropriate measures for cases of this kind until after there has been a marked diminution in the activity of the disease, as shown by a decrease in the production of albumen and an increase of urea, or a marked rise in the coefficient of toxicity.

In cases of excessive nervous and mental excitability, massage must be used only when great care is taken to select the right measures, and the treatment in such cases must be administered with unusual skill. The lighter measures of massage only are admissible in these cases. Percussion must generally be altogether interdicted. Gentle, deep kneading (246) and centrifugal friction (194) are most appropriate measures, and these should be employed derivatively.

Among the most valuable preventive measures to be employed in massage when administered in ordinary cases of "rest-cure," should be mentioned abdominal massage (389-424). Massage of the stomach (451), bowels, and liver aids greatly in counteracting the evil effects of rest upon these viscera, and in facilitating the processes of digestion and elimination, in fact promoting all the functions of the organs named, as well as those of the kidneys.

Another measure of greatest importance, in addition to general and abdominal massage, is to be found in lung gymnastics (381-384), which not only greatly aid the functions of the liver, stomach, and other viscera, but also relieve the brain of blood, thus preventing cerebral congestion, and promote elimination. Breathing exercises also promote the formation of blood, thus preventing anæmia, and greatly aiding the oxidation and elimination of waste matters. These exercises are valuable not only in ordinary cases, but in fevers, Bright's disease, and in fact in every case in which the "rest-cure" is employed, except acute pleurisy and pulmonary hemorrhage, in which, of course, it is important to secure as great a degree of quietude as possible.

The employment of lung gymnastics in fevers is a valuable means of combating the depressing tendency of the disease, and of preventing the pneumonia which frequently accompanies fevers of a low type. It also aids in lowering temperature, not only by cooling the blood, but also by assisting in oxidation and elimination of the toxic substances to which the rise of temperature is due.

Ewald measured the temperature of the stomach by a thermo-electric device, and found it to be, on an average, 1° F. higher than in the axilla. By making the patient breathe forcibly, even with the mouth closed, the temperature of the stomach was reduced to half a degree less than the axillary temperature. When the patient breathed steam at the temperature of the body, this lowering of the temperature of the stomach did not occur, showing that the internal temperature may be lowered by bringing the blood into contact with an increased quantity of cool air through forced respiration.

This measure has not been employed in febrile cases as much as it deserves to be. It is, of course, important that the patient should be entirely passive. The increased breathing activity should be secured by movements executed by the masseur, who, by raising the arms from the sides and drawing them upward, will aid inspiration; then, by returning them to the sides, and compressing the sides of the chest, may aid expiration. Cyanosis, which so frequently accompanies febrile action when the temperature rises to a dangerous point, may be made quickly to disappear by this means.

Position is a matter also worthy of mention as a means of combating some of the evil tendencies of rest. In cases with a tendency to cerebral hyperæmia, the head of the bed should be raised, thus utilizing gravity as a means of securing drainage of the brain. This is especially important in cases of apoplexy, and the same measure should be employed in pulmonary hemorrhage. In hemorrhage from other parts of the body, resulting in anæmia, the opposite plan should be followed, the foot of the bed being raised. This measure should also be adopted whenever it is desirable to antagonize congestion or inflam-

mation in the lower extremities. Pelvic pain due to disease of the ovaries or of the bladder, prostate, or rectum, is often greatly relieved by raising the foot of the bed, in connection with rest in the recumbent position.

From what has been said, it is evident that massage is practically indispensable as a complementary measure of treatment in connection with the "rest-cure," and that it may be applied in some form in all cases requiring rest, and in such a manner as to greatly increase the advantages which may be derived from the "rest-cure."

After-rest Exercise.—A point of very great importance, to which attention should be called, is that rest alone seldom results in a radical cure. Rest secures a symptomatic cure, but does scarcely more than this, except to provide conditions favorable for recovery. Other recuperative measures must also be employed in connection with rest. Massage has been shown to be an invaluable remedy for this purpose. The "rest-cure" is only a preparation for exercise-cure. The patient who has been put to bed, and who has been relieved of his morbid symptoms by the rest thus obtained, must be made capable of enjoying good health upon his feet. To be cured in bed is not sufficient, as few sick people desire to spend their lives there. The patient must be gotten upon his feet, and enabled to endure at least an ordinary amount of exercise without injury, before he can be considered well. Neglect of this point has resulted in a failure to effect anything more than temporary relief by means of the "rest-cure" in perhaps a large proportion of all the cases in which this measure has been employed. But as this point has been considered quite fully elsewhere in this work, the reader is referred to what has already been said. The author would, however, emphasize the importance of supplementing, in every case, a course of "rest-cure" with a course of carefully graduated exercises, by which the patient may be safely introduced to life under ordinary conditions. The author expects to be able to place in press at an early date a work in which will be given many such series of exercises, adapted to different conditions.

RULES RELATING TO MASSAGE.

1. *Correct Use of Terms.*—In speaking of massage or its application, be careful to use correct terms (pp. 238, 239).

2. *Good Health Necessary.*—Of all persons, one who administers massage should have perfect health. The so-called magnetism which renders some persons so much more successful than others in massage, as well as in other callings, is largely the outgrowth of the vivacity, freshness, good cheer, and good nature which result from abounding health. A few things of special importance in this relation are proper diet; healthful, loose, and appropriate clothing; a daily cool morning sponge bath; and daily out-of-door exercise.

3. *Personal Cleanliness.*—Massage is hard work, equal to almost any form of manual labor. A masseur who does his duty will perspire vigorously; hence the necessity of due attention to personal cleanliness. Cleansing of the skin may be promoted by the addition of a little carbonate of ammonia to the water used for the morning bath. When one perspires freely, stockings and underclothing should be changed daily. After airing for a day or two, the same garment may be worn again for a day. Special attention must also be given to the hands, teeth, and also the nasal cavity, if a catarrhal condition is present, and to the hair and scalp.

4. *The Hands.*—Good hands are necessary for success in massage. The hands must be soft, warm, dry, strong, and elastic. A bony, sweaty, hard, or calloused hand is exceedingly objectionable. The hands should also be free from blemishes, such as warts, abrasions, chaps, etc. The nails should be trimmed close. Absolute cleanliness is the best means of promoting a healthy state of the skin of the hands.

as well as other parts. A perfectly clean hand is not likely to chap. Always wash the hands just before giving massage; doing so, if convenient, in the presence of the patient, or at least with his knowledge. Always wash the hands a second time just before manipulating the head, face, or neck, if the hands have been used upon other parts since washing. The following lotions are valuable for keeping the hands in a healthy state:—

- | | |
|----------------------------|----------------------|
| (1) Comp. tr. benzoin..... | dr. 4. |
| Alcohol..... | oz. $\frac{1}{2}$. |
| Glycerine..... | oz. 1. |
| Water..... | oz. 2. |
| (2) Borax..... | dr. $1\frac{1}{2}$. |
| Carbonate of soda | dr. $1\frac{1}{2}$. |
| Carbonate of ammonia..... | dr. 2. |
| Aquæ ammonia..... | dr. 4. |
| Glycerine..... | oz. 1. |
| Water to make..... | oz. 6. |

5. *The Personal Appearance.*—Simplicity, neatness, and tidiness in dress are in the highest degree commendable. The personal appearance should be made attractive by extreme care and appropriateness in dress, without showiness, which always indicates vulgarity or ignorance. Nurses connected with a hospital in which a uniform is used should always wear it when on professional duty.

6. No person should undertake to practice massage who has not received a thorough practical training. Massage is both an art and a science, and only those who have had long practice can be thoroughly efficient.

7. Never countenance the belief that vitality, magnetism, or any other occult force is imparted by manipulation. Avoid flourishes.

8. Do not be hurried, flurried, nor out of breath from fast walking, in approaching a patient to administer massage.

9. Avoid a bustling, nervous manner.

10. Only in most extraordinary cases and under exceptionally justifying circumstances, and then only in the presence of

other persons, should a masseur or a masseuse administer massage to an adult person of the opposite sex.

11. The room in which massage is given should be well ventilated, temperature about 75° to 80° F.

12. As a rule, the patient should be undressed, or clad in a single loose gown. Care should be taken to keep the body well covered, with the exception of the part undergoing manipulation.

13. The patient should be placed in an easy, comfortable position.

14. The position of the operator varies with the part operated upon, but should always be such as is best suited for the part undergoing manipulation.

15. In bending over the patient, the body should be flexed at the hips, not at the waist or shoulders. By this precaution the masseur may avoid becoming round-shouldered. The height of the bed or couch should be such that the masseur will not need to bend to any great extent.

16. Movements of the hands should always be executed from the wrist.

17. Apply as much of the surface of the hands and fingers as possible to the part operated upon, thus distributing the pressure and saving time.

18. The body should be gone over systematically, for which purpose it should be divided into separate territories. Each part should be finished before going to another part.

19. Opposite sides of the body should be manipulated in succession, so as to intensify the effect upon the nerve centers.

20. The masseur should always keep in mind the anatomy of the body,—the outline of the bones, the location of the large nerves, arteries, and veins, and of the principal muscular groups,—and should take care to follow the bones, thinking of the bony framework as well as its covering of soft parts. Work down between the muscles and tendons, around the head of the bones, taking special care to work into all the

irregularities of the joints, where the blood vessels and lymph channels are the largest.

21. At the beginning, movements should be slow and gentle, being gradually increased in rapidity and force to the maximum, then gradually diminished to the termination.

22. As a rule, always employ the same rate of motion for the same movement. This indicates skill and good training.

23. It is well to run rapidly and lightly over a part before giving the more vigorous movements.

24. In the first application of massage to a patient not accustomed to treatment, great care should be taken not to produce soreness and black-and-blue spots. These unpleasant effects are especially likely to occur in fleshy and aged persons, owing to the feeble circulation in the adipose tissues of the first class, and the brittleness of the blood vessels of the second class. Fever convalescents and persons who have been long in bed are also liable to these effects, for similar reasons.

25. For relief of sensitive parts, employ only gentle stroking over the affected areas, and administer derivative massage to the muscles and other tissues of the vicinity, especially between the affected part and the heart. The painful part may be approached by degrees until applications can be made directly to it.

26. In many cases it is well to lubricate the hand with some anctuous substance, such as olive oil, fine vaseline, cocoanut oil, or cacao butter. The last-named substance is, perhaps, the best of all. It is solid at ordinary temperatures, melting, however, at the temperature of the body. A cake of cacao butter rubbed upon the hands occasionally during the administration of massage, keeps the hands well lubricated without smearing the body of the patient with a surplus of oil. In case oil is objectionable, talcum powder may be used.

27. Lubricants should always be used when much pressure is required, and where prolonged manipulation is necessary, also in the treatment of parts where the skin is extremely sensitive.

28. When it is desired to stimulate the skin to a high degree by friction, lubricants should be avoided. A part may be rubbed six to ten minutes when oil is employed; but the same surface should not be operated upon more than from two to five minutes when a lubricant is not used.

29. Some authorities recommend that the parts should be shaved before the application of massage, but this is rarely necessary, and when the treatment must be employed some weeks, may become a source of inconvenience by promoting the growth of hair.

30. The amount of massage administered must be suited to each case and to the mode of application.

31. Do not recommend massage for everything.

32. General massage should never be given in cases of fever. Local applications should not be made to parts which are the seat of acute inflammation.

33. Fleshy persons do not bear massage well, for the reason that the manipulations set free a large amount of waste matter and imperfectly oxidized products which, absorbed into the system, produce the same effect as excessive exercise,—effects resembling those of consecutive or secondary fatigue, to which fleshy persons are very liable. Fleshy persons often complain of languor, lassitude, and lameness after massage, and the tissues are very easily bruised because the blood vessels are fragile and on account of the excessive amount of adipose tissue. Another cause is probably the disproportion existing between the lymph spaces and the amount of waste matter set free, much of the intracellular space is occupied by fat and subcutaneous tissue.

34. Massage is contra-indicated in nearly all forms of skin disease, except in the thickened condition of the skin left behind by chronic eczema. It is also contra-indicated in acute cases of apoplexy and in the early stages of neuritis, when excessive irritability still exists, and should never be administered to abscesses, tumors, or tubercular joints.

35. *Order in General Massage.*—(1) Arms; (2) Chest; (3) Legs; (4) Abdomen; (5) Hips; (6) Back; (7) Head; (8) Neck.

36. *General Observations.*—Percussion is sometimes more effective in stimulating the development of a weak muscle than either kneading or faradization.

37. Percussion and vibration should be avoided in hyperæsthesia. In such cases, deep kneading, stroking, and joint movements may be employed.

38. Deep kneading is especially suitable for excitable neurasthenics and patients suffering from chorea.

39. In infantile paralysis and other diseases accompanied by lowered vitality and diminished activity without increased sensibility, percussion is especially indicated.

40. In chorea and locomotor ataxia,—in fact, in most cases in which massage is valuable,—gymnastics should be added. In locomotor ataxia the patient should exercise by walking and standing with the eyes closed, to develop the coördinating centers.

41. In convalescence from fevers, massage must be applied with care, because of the disturbance of the heat-regulating function on the part of the body. The same is true in tuberculosis and exophthalmic goiter. Use chiefly friction in such cases.

42. Patients in whom the skin is rigid and inelastic, or in a “hidebound” condition, should be prepared for general massage by the administration of a warm bath.

43. In some patients the application of oil to the surface is objectionable through the irritating effect of oleaginous matters upon the susceptible skin, especially in persons subject to certain forms of skin disease. In such cases we have found a glycerine ointment compounded after the following formula, an excellent substitute: Glycerine, 15 oz.; boracic acid, $1\frac{1}{2}$ oz.; starch, $1\frac{1}{2}$ oz.; gum tragacanth, $1\frac{1}{2}$ oz.; oil of wintergreen, 1 dr. After lubricating the surface with the ointment, a little moisture should be added by dipping the tips of the fingers in water. By means of a moist towel this lubricant can be completely removed after the treatment, leaving the skin delightfully smooth. Talcum powder is preferable in warm weather.

CORRECT USE OF TERMS.

So much ignorance and incorrect usage prevails in relation to the various terms employed in connection with *massage* and its administration, that it will be worth while to devote a few lines to this part of the subject, as no one thing is so suggestive of ignorance or proficiency as the misuse or correct use of terms.

Massage is a noun, the literal meaning of which is kneading, as a baker kneads bread. This word, like many other terms relating to *massage*, is derived directly from the French. It retains its French pronunciation, and is pronounced as though spelled *mas-sahzh*, and not as though spelled *massaj* or *massaje*, which is so frequently heard.

Masser is a verb, meaning the act of applying *massage*. It is pronounced as though spelled *mas-say*.—I *masse*; you *masse*; he *massees* (pronounced as though spelled *mas-sa-es*).

Massing is the present participle, and is pronounced as though spelled *mas-sa-ing*.—I am *massing*.

Massed is the past participle, and is pronounced as though spelled *mas-sa-ed*.—I *massed* a patient yesterday.

Massour is pronounced very nearly as if spelled *mas-ur*. The term is applied to a man who administers *massage*.

Massuse is pronounced very nearly as if spelled *mas-uss*. The term is applied to a woman who administers *massage*.

Pétrissage is pronounced as though spelled *pa-tris-sahzh*. It is a French term applied to deep kneading, as distinguished from superficial kneading.

Tapotement is pronounced nearly as though spelled *tah-pote-mont*, and indicates the act of percussion.

Effleurage is pronounced as though spelled *ef-flur-ahzh*. It means light friction.

Centripetal,—toward the center. In relation to massage, the term is applied to movements made in the direction of the blood current in the veins.

Centrifugal,—from the center. This term is applied to movements made from the heart, or in the direction of the arterial blood current.

THE GENERAL PHYSIOLOGY, NAMES, NERVE SUPPLY, AND ACTIONS OF THE MUSCLES OF THE HUMAN BODY.

Physiology of the Muscles.—The following brief summary of the physiology of the muscles, while incomplete, will assist somewhat in understanding the relation of these structures, with which massage deals so directly, to other bodily organs :—

1. Muscular action is allied to ciliary and amoeboid movements.

2. The source of muscular energy is the oxidation of glycogen stored in the muscles.

3. During work, the amount of oxygen absorbed and the amount of CO_2 given off by the muscles, is very greatly increased ; hence respiratory activity is increased.

4. Muscular activity is accompanied by the production of heat ; the muscles are the principal seat of heat production in the body. The thermic activities of the muscles are dependent, not only upon muscular activity, but also upon nerve control, through the heat-centers of the central nervous system.

5. Muscular activity is usually excited by nervous impulses received by the muscle at the rate of about ten per second.

6. The muscle has an independent excitability which induces contraction, as the result of the application of chemical substances, cold, electricity, and mechanical stimulus.

7. Acids and excessive heat produce stiffening of the muscles.

8. A single voluntary muscular movement may be made in one sixteenth of a second.

9. Contraction from electrical stimulation occurs more quickly than from voluntary effort.

10. With contraction of a muscle, contraction of the opposing muscle occurs simultaneously, beginning slightly later.

11. Voluntary contraction is allied to tetanus.

12. Tetanus is produced by electrical applications in which the current is interrupted at the rate of twenty or more per second.

13. Muscular contraction is propagated along the muscle at the rate of forty feet per second.

14. Muscles are most perfect machines. The best steam engine utilizes only one eighth of the force contained in the fuel as work, seven eighths appearing as heat. A muscle produces one fifth work and four fifths heat.

15. The amount of work a muscle can do is proportioned to its transverse section.

16. A human muscle is able to lift 125 pounds for each square inch in area of its transverse section.

17. Muscular strength varies at different periods of life. A new-born infant is able to sustain its own weight for 24 seconds by grasping a stick with its hands. The strength of adult men and women, in relation to the body weight, is shown in Table I.

18. The weight of the muscles in proportion to the body weight varies at different ages, being 28.40 per cent of the body weight of a new-born babe, and 43.10 per cent of the body weight in adults.

19. The amount of work done by a laboring man in eight hours is about two million foot-pounds.

20. Fatigue is the result of the accumulation, within the muscle, of the poisonous products of work; the muscle is rested when these products are removed.

THE MUSCLES, THEIR NERVE SUPPLY AND ACTION.

NAME.	NERVE.	ACTION.
<i>Head and Face.</i>		
Occipito-frontalis.....	Posterior auricular, small occipital, facial.	Moves scalp and wrinkles forehead.
Attollens aurem.....	Occipitalis minor.....	Raises ear.
Attrahens aurem.....	Facial.....	Advances ear.
Retrahens aurem.....	Posterior auricular.....	Retracts ear.
Orbicularis palpebrarum.....	Facial.....	Closes eyelids.
Corrugator supercili.....	Facial.....	Draws eyebrows down and in.
Tensor tarsi.....	Facial.....	Compresses puncta and lachrymal sac.
Levator palpebræ superior.....	Third.....	Raises upper lid.
Rectus superior (eye).....	Third.....	Rotates eyeball upward.
Rectus inferior “.....	Third.....	Rotates eyeball downward.
Rectus internus “.....	Third.....	Rotates eyeball inward.
Rectus externus “.....	Sixth.....	Rotates eyeball outward.
Obliquus superior “.....	Fourth.....	Rotates eyeball down and out.
Obliquus inferior “.....	Third.....	Rotates eyeball up and out.
Pyramidalis nasi.....	Facial.....	Depresses eyebrow.
Levator labii superioris alæque nasi.....	Facial.....	Elevates upper lip, dilates nostril.
Dilator naris posterior.....	Facial.....	Dilates nostril.
Dilator naris anterior.....	Facial.....	Dilates nostril.
Compressor nasi.....	Facial.....	Contracts nostril.
Compressor narium minor.....	Facial.....	Contracts nostril.
Depressor alæ nasi.....	Facial.....	Contracts nostril.
Levator labii superioris.....	Facial.....	Elevates upper lip.
Levator anguli oris.....	Facial.....	Elevates angle of mouth.
Zygomaticus major.....	Facial.....	Draws upper lip backward and upward.
Zygomaticus minor.....	Facial.....	Draws upper lip backward and upward.

MUSCLES OF THE BODY.

Levator labii inferioris.....	Facial.....	Elevates lower lip.
Depressor labii inferioris.....	Facial.....	Depresses lower lip.
Depressor anguli oris.....	Facial.....	Depresses angle of mouth.
Buccinator.....	Facial.....	Compresses cheeks.
Risorius.....	Facial.....	Draws angle of mouth outward.
Orbicularis oris.....	Facial.....	Closes mouth.
Masseter.....	Facial.....	Mastication, molars.
Temporal.....	Inferior maxillary.....	Mastication, incisors.
Pterygoideus externus.....	Inferior maxillary.....	Moves lower jaw forward.
Pterygoideus internus.....	Inferior maxillary.....	Raises and advances inferior maxillary.
<i>Neck.</i>		
Platysma myoides.....	Facial and superficial cervical.....	Wrinkles skin and depresses mouth.
Sterno-cleido-mastoid.....	Spinal accessory and cervical plexus.	Depresses and rotates head.
Sterno-hyoid.....	Descendens and communicans noni..	Depresses hyoid.
Sterno-thyroid.....	Descendens and communicans noni..	Depresses larynx.
Thyro-hyoid.....	Hypoglossal.....	Elevates larynx.
Omo-hyoid.....	Descendens and communicans noni..	Depresses and retracts hyoid.
Digastric.....	Inferior dental (facial).....	Elevates hyoid and tongue.
Stylo-hyoid.....	Facial.....	Elevates and retracts hyoid.
Mylo-hyoid.....	Inferior dental.....	Elevates and advances hyoid; forms floor of mouth.
Genio-hyoid.....	Hypoglossal.....	Elevates and advances hyoid.
Genio-hyo-glossus.....	Hypoglossal.....	Retracts and protrudes tongue.
Hyo-glossus.....	Hypoglossal.....	Depresses side of tongue.
Lingualis.....	Chorda tympani.....	Elevates center of tongue.
Stylo-glossus.....	Hypoglossal.....	Elevates and retracts tongue.
Palato-glossus.....	Meckel's ganglion.....	Draws base of tongue upward.
Constrictor inferior.....	Glosso-pharyngeal, pharyngeal plexus, and external and recurrent laryng'l. and glosso-pharyngeal plexus.	Contracts fauces.
Constrictor medius.....	Glosso-pharyngeal and pharyngeal plexus.	Contracts fauces.
Constrictor superior.....	Glosso-pharyngeal and pharyngeal plexus.	Contracts pharynx.
Stylo-pharyngeus.....	Glosso-pharyngeal and pharyngeal plexus.	Elevates pharynx.

NAME.	NERVE.	ACTION.
Palato-pharyngeus.	Meckel's ganglion.	Closes posterior nares.
Levator palati.	Meckel's ganglion (facial).	Elevates soft palate.
Tensor palati.	Otic ganglion.	Renders palate tense.
Azygos uvulæ.	Meckel's ganglion (facial).	Raises uvula.
Rectus capitis anticus major.	Cervical plexus.	Flexes neck backward.
Rectus capitis anticus minor.	Cervical plexus.	Flexes neck backward.
Rectus lateralis.	Cervical plexus.	Moves head laterally.
Longus colli.	Lower cervical.	Flexes cervical spine.
Scalenus anticus.	Lower cervical.	Flexes neck laterally.
Scalenus medius.	Lower cervical.	Flexes neck laterally.
Scalenus posticus.	Lower cervical.	Flexes neck laterally.
<i>Back.</i>		
Trapezius.	Spinal accessory and cervical plexus.	Draws head backward and elevates shoulders.
Latissimus dorsi.	Subscapular.	Draws arm backward and downward.
Levator anguli scapulæ.	Third and fourth cervical.	Elevates upper angle of scapula.
Rhomboideus minor.	Fifth cervical.	Retracts and elevates scapula.
Rhomboideus major.	Fifth cervical.	Elevates and retracts scapula.
Serratus posticus superior.	Posterior branches of cervical.	Raises ribs in inspiration.
Serratus posticus inferior.	Posterior branches of dorsal.	Depresses ribs in expiration.
Splenius capitis et colli.	Posterior branches of cervical.	Rotates head and holds it erect.
Splenius colli.	Posterior branches of cervical.	Rotates head and holds it erect.
Erector spinæ.	Lumbar and dorsal.	Holds spine erect.
Sacro-lumbalis.	Branches of dorsal.	Erects trunk and flexes it backward.
Musculus accessorius ad sacro-lumbalem.	Branches of dorsal.	Erects trunk and flexes it backward.
Longissimus dorsi.	Branches of lumbar and dorsal.	Erects trunk and flexes it backward.
Spinalis dorsi.	Dorsal branches.	Erects spinal column.
Cervicalis ascendens.	Branches of cervical.	Holds head erect and raises upper ribs.
Transversalis colli.	Branches of cervical.	Holds head erect.

Trachelo-mastoid Complexus.....	Branches of cervical. Sub-occipital, great occipital, and branches of cervical.	Steadies head. Retracts and rotates head.
Biventer cervicis.....	(The same as for complexus).....	Retracts and rotates head.
Semispinalis dorsi.....	Branches of dorsal.....	Erects spinal column.
Semispinalis colli.....	Cervical branches.....	Erects spinal column.
Multifidus spinæ.....	Posterior spinal branches.....	Erects and rotates spinal column.
Rotatores spinæ.....	Dorsal branches of spine.....	Rotate spinal column.
Supraspinales.....	Posterior cervical.....	Approximate spinous processes.
Interspinales.....	Posterior cervical.....	Approximate spinous processes.
Extensor coccygis.....	Sacral branches.....	Extends coccyx.
Intertransversales.....	Posterior spinal nerves.....	Approximate transverse processes.
Rectus capitis posticus major.....	Sub. occipital.....	Rotates head.
Rectus capitis posticus minor.....	Sub. occipital.....	Draws head backward.
Obliquus capitis superior.....	Sub. occipital.....	Draws head backward.
Obliquus capitis inferior.....	Sub. and great occipital.....	Rotates head.
<i>Abdomen.</i>		
Obliquus externus.....	Intercostal, ilio-hypogastric, ilio-in- guinal.	Compresses viscera and flexes thorax.
Obliquus internus.....	Intercostal, ilio-hypogastric, ilio-in- guinal.	Compresses viscera and flexes thorax.
Transversalis.....	Intercostal, ilio-hypogastric, ilio-in- guinal.	Compresses viscera and flexes thorax.
Rectus abdominis.....	Intercostal, ilio-hypogastric, ilio-in- guinal.	Compresses viscera and flexes thorax.
Pyramidalis.....	Ilio-hypogastric.....	Compresses viscera and flexes thorax.
Quadratus lumborum.....	Lumbar.....	Renders linea alba tense. Flexes thorax laterally.
<i>Thorax.</i>		
Intercostales externi.....	Intercostal.....	Depress ribs in expiration.
Intercostales interni.....	Intercostal.....	Raise ribs in inspiration.
Infracostales.....	Intercostal.....	Inspiration.
Triangularis sterni.....	Intercostal.....	Expiration.
Levatores costarum.....	Intercostal.....	Raise ribs.
Diaphragm.....	Phrenic.....	Inspiration.

NAME.	NERVE.	ACTION.
<i>Shoulder.</i>		
Pectoralis major.....	Anterior thoracic.....	Draws arm down and forward.
Pectoralis minor.....	Anterior thoracic.....	Depresses point of shoulder.
Subclavius.....	Fifth and sixth cervical.....	Depresses shoulder.
Serratus magnus.....	Posterior thoracic.....	Raises shoulder and elevates ribs in inspiration.
<i>Deltoïd.</i>		
Deltoïd.....	Circumflex.....	Raises arm.
Subscapularis.....	Subscapular.....	Rotates humerus inward.
Supraspinatus.....	Suprascapular.....	Supports shoulder joint, raises arm.
Infraspinatus.....	Suprascapular.....	Rotates humerus outward.
Teres minor.....	Circumflex.....	Rotates humerus outward.
Teres major.....	Subscapular.....	Draws arm down and back.
<i>Arm.</i>		
Coraco-brachialis.....	Musculo-cutaneous.....	Draws arm forward and inward.
Biceps.....	Musculo-cutaneous.....	Flexes and supinates forearm.
Brachialis anticus.....	Musculo-cutaneous, musculo-spiral...	Flexes forearm.
Triceps.....	Musculo-spiral.....	Extends forearm.
Subanconeus.....	Musculo-spiral.....	Tensor of posterior ligament of elbow.
<i>Forearm.</i>		
Pronator radii teres.....	Median.....	Pronates hand.
Flexor carpi radialis.....	Median.....	Flexes wrist.
Palmaris longus.....	Median.....	Tenses palmar fascia.
Flexor carpi ulnaris.....	Ulnar.....	Flexes wrist.
Flexor sublimus digitorum.....	Median.....	Flexes second phalanges.
Flexor profundus digitorum.....	Ulnar and anterior interosseus.....	Flexes the phalanges.
Flexor longus pollicis.....	Anterior interosseus.....	Flexes last phalanx of thumb.
Pronator quadratus.....	Anterior interosseus.....	Pronates hand.
Supinator longus.....	Musculo-spiral.....	Supinates hand.
Extensor carpi radialis longior.....	Musculo-spiral.....	Extends wrist.
Extensor carpi radialis brevior.....	Posterior interosseus.....	Extends wrist.
Extensor communis digitorum.....	Posterior interosseus.....	Extends fingers.

Extensor minimi digiti.....	Posterior interosseus.....	Extensor of little finger.
Extensor carpi ulnaris.....	Posterior interosseus..	Extends wrist.
Anconeus.....	Musculo-spiral.....	Extends forearm.
Supinator brevis.....	Posterior interosseus.....	Supinates hand.
Extensor ossis metacarpi pollicis.....	Posterior interosseus.....	Extends thumb.
Extensor primi internodii pollicis.....	Posterior interosseus.....	Extends thumb.
Extensor secundi internodii pollicis.....	Posterior interosseus.....	Extends thumb.
Extensor indicis.....	Posterior interosseus.....	Extends index.
Abductor pollicis.....	Median.....	Draws thumb from median line.
Flexor ossis metacarpi pollicis (oppon).	Median.....	Flexes thumb.
Flexor brevis pollicis.....	Median and ulnar.....	Flexes thumb.
<i>Hand.</i>		
Adductor pollicis.....	Ulnar.....	Draws thumb to median line.
Palmaris brevis.....	Ulnar.....	Corrugates skin of palm.
Abductor minimi digiti.....	Ulnar.....	Abductor of little finger.
Flexor brevis minimi digiti.....	Ulnar.....	Flexes little finger.
Flexor minimi digiti (opponens).....	Ulnar.....	Flexes little finger.
Lumbricales.....	Median and ulnar.....	Flex first phalanges and extend second and third.
Interossei palmaris.....	Ulnar.....	Adduct fingers.
Interossei dorsales.....	Ulnar.....	Abduct fingers, flex first phalanges, and extend second and third.
<i>Lower extremity.</i>		
Psoas magnus.....	Lumbar.....	Flexes and rotates thigh outward and flexes trunk on pelvis.
Psoas parvus.....	Lumbar.....	Tensor of iliac fascia.
Iliacus.....	Anterior crural.....	Flexes femur and rotates it outward.
<i>Hip.</i>		
Gluteus maximus.....	Small sciatic and sacral plexus.....	Extends and abducts thigh and rotates it outward.
Gluteus medius.....	Superior gluteal.....	Rotates outward and inward, abducts, extends, and flexes thigh.
Gluteus minimus.....	Superior gluteal.....	Rotates outward and inward, abducts, extends, and flexes thigh.

NAME.	NERVE.	ACTION.
<i>Pyriformis</i>	Sacral	Rotates thigh outward, abducts it, and tilts pelvis forward.
<i>Gemellus superior</i>	Sacral	Rotates thigh outward and abducts it.
<i>Obturator internus</i>	Sacral	Rotates thigh outward and tilts pelvis forward.
<i>Gemellus inferior</i>	Sacral	Rotates thigh outward and abducts it.
<i>Obturator externus</i>	Obturator.....	Rotates thigh outward and tilts pelvis forward.
<i>Quadratus femoris</i>	Sacral	Abducts thigh and rotates it outward.
<i>Biceps</i>	Great sciatic.....	Flexes leg and rotates it outward.
<i>Semitendinosus</i>	Great sciatic.....	Flexes leg on thigh and rotates it inward.
<i>Semimembranosus</i>	Great sciatic.....	Flexes leg and rotates it inward.
<i>Thigh.</i>		
<i>Tensor vaginæ femoris</i>	Superior gluteal.....	Tensor of fascia lata.
<i>Sartorius</i>	Anterior crural.....	Flexes thigh and rotates it outward.
<i>Rectus femoris</i>	Anterior crural.....	Extends leg.
<i>Vastus externus</i>	Anterior crural.....	Extends leg.
<i>Vastus internus</i>	Anterior crural.....	Extends leg.
<i>Crureus</i>	Anterior crural.....	Extends leg.
<i>Quadriceps extensor</i> (includes four preceding muscles).		
<i>Subcrureus</i>	Anterior crural.....	Acts with crureus.
<i>Gracilis</i>	Obturator.....	Flexes and adducts thigh and rotates it inward.
<i>Pectineus</i>	Anterior crural, obturator.....	Flexes and adducts thigh and rotates it outward.
<i>Adductor longus</i>	Obturator.....	Adducts and flexes thigh.
<i>Adductor brevis</i>	Obturator.....	Adducts and flexes thigh.
<i>Adductor magnus</i>	Obturator and great sciatic.....	Adducts thigh and rotates it outward.
<i>Leg.</i>		
<i>Tibialis anticus</i>	Anterior tibial.....	Flexes ankle and elevates inner border of foot.

Extensor longus digitorum.....	Anterior tibial.....	Extends toes and flexes ankle.
Extensor proprius pollicis.....	Anterior tibial.....	Extends toes and flexes ankle.
Peroneus tertius.....	Anterior tibial.....	Flexes tarsus and raises outer border of foot.
Gastrocnemius.....	Internal popliteal.....	Extends foot.
Plantaris.....	Internal popliteal.....	Tenses plantar fascia.
Soleus.....	Internal popliteal.....	Extends foot.
Popliteus.....	Internal popliteal.....	Flexes leg and rotates it inward.
Flexor longus pollicis.....	Posterior tibial.....	Flexes great toe.
Flexor longus digitorum.....	Posterior tibial.....	Flexes phalanges and extends foot.
Tibialis posticus.....	Posterior tibial.....	Entends ankle and turns sole inward.
Peroneus longus.....	Musculo-cutaneous.....	Extends and everts foot.
Peroneus brevis.....	Musculo-cutaneous.....	Extends foot.
<i>Foot.</i>		
Extensor brevis digitorum.....	Anterior tibial.....	Extends toes.
Abductor pollicis.....	Internal plantar.....	Abducts great toe, flexes first phalanx, and extends second.
Flexor brevis digitorum.....	Internal plantar.....	Flexes lesser toes.
Abductor minimi digiti.....	External plantar.....	Abducts little toe.
Flexor accessorius.....	External plantar.....	Accessory flexor of toes.
Lumbricales.....	Internal and external plantar.....	Flex first phalanges and extend last two.
Flexor brevis pollicis.....	Internal plantar.....	Flexes first phalanx of great toe and extends second.
Adductor pollicis.....	External plantar.....	Adducts great toe and extends first and second phalanx.
Flexor brevis minimi digiti.....	External plantar.....	Flexes first phalanx of little toe and extends second.
Transversus pedis.....	External plantar.....	Adducts great toe.
Interossei dorsai.....	External plantar.....	Abduct toes.
Interossei.....	External plantar.....	Adduct toes.

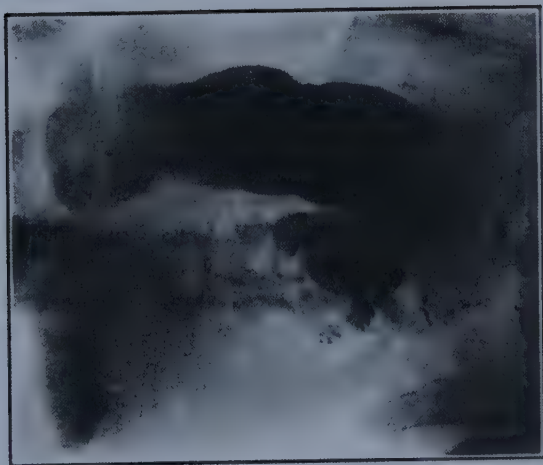
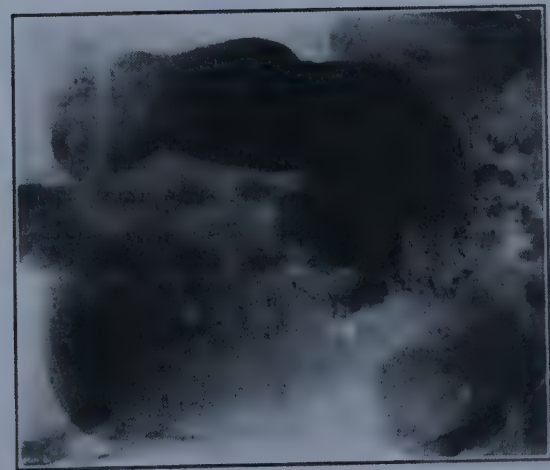
The foregoing table has been arranged with much care, and with special reference to the needs of the student of massage. It is believed to be the most complete and correct resumé of the sort which has ever been published, embodying, as it does, the results of the very latest studies and authoritative statements relating to the nerve supply and actions of the various muscles of the body. The student of massage who desires to place himself in the front rank of his profession as a masseur, will find it not only profitable, but essential, to make a careful study of this table, and to become familiar with the facts which it very succinctly presents. The grouping of the muscles of the several regions of the body renders it convenient to study each section by itself, and by the aid of Plates V to X and XIII, it will not be found difficult to form a very correct idea of the precise location and outline of each particular muscle in the body, and of the origin and distribution of the nerve supply. Two hundred and seven different muscles or muscular groups are named in the table, by means of which one hundred and sixty-three different motor acts are performed. It may not be absolutely essential that every one of these should be held constantly in the memory, but those muscles, at least, which constitute the largest fleshy masses of the body, should be thoroughly studied and familiarized.

X-RAY AND MASSAGE

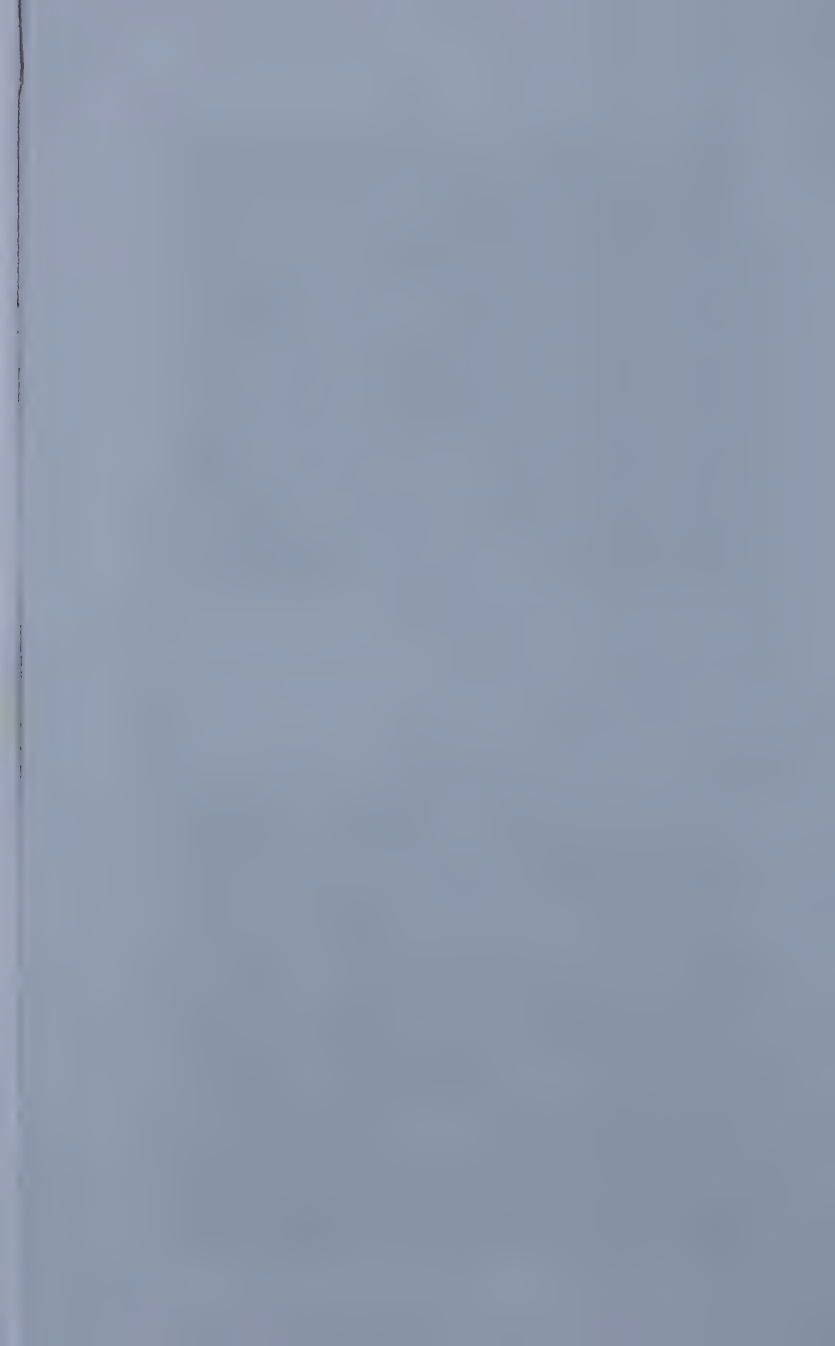
THE perfection in X-ray technic which has been attained within the last few years has rendered this means of diagnosis indispensable as a guide in the application of massage, especially in the treatment of conditions affecting the stomach and colon, and certain other abdominal viscera. In all cases of obstinate constipation an X-ray examination should be made before beginning treatment by massage. In no other way is it possible for the masseur to obtain the information needed to guide him in an intelligent effort to correct by manipulations any morbid condition which may be present. Without such an examination it is impossible to know the nature of the disorder to be dealt with, or even the exact location of the trouble. An X-ray examination will often reveal to the masseur the fact that he has been attempting to massage the colon by manipulations across the upper part of the abdomen when the organ actually lay below the brim of the pelvis quite outside the field of his activities. If not altogether indispensable as a guide to massage of the abdomen an X-ray examination is certainly capable of affording information so valuable that whenever possible its aid should be sought and utilized to the fullest extent.

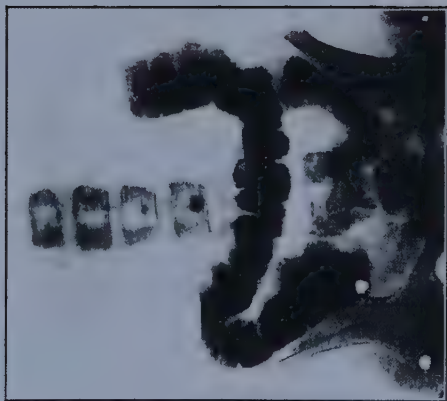
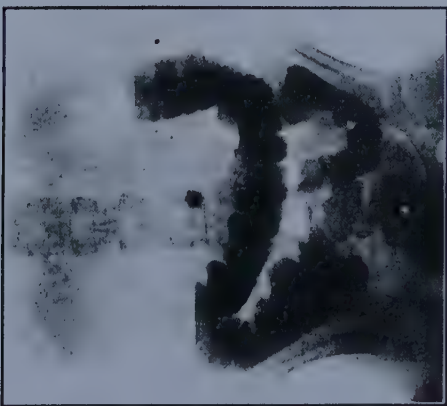
PALPATION OF THE STOMACH

Since the application of massage to the abdominal region is almost exclusively for the purpose of influencing the stomach or colon, it is of the highest importance to know the exact location of these organs. Modern X-ray studies by the aid of the bismuth meal have shown that the old conceptions of the form and location of the stomach and colon are far from correct. The accompanying radiographs, furnished me by Dr. Case, the roentgenologist of the Battle Creek Sanitarium, show the stomach in what may be regarded as its normal position. It will be noted that the stomach with the body in the horizontal position saddle-bags the vertebral column but lies with by far the greater portion of the organ upon the left side. The weight of the gastric contents,

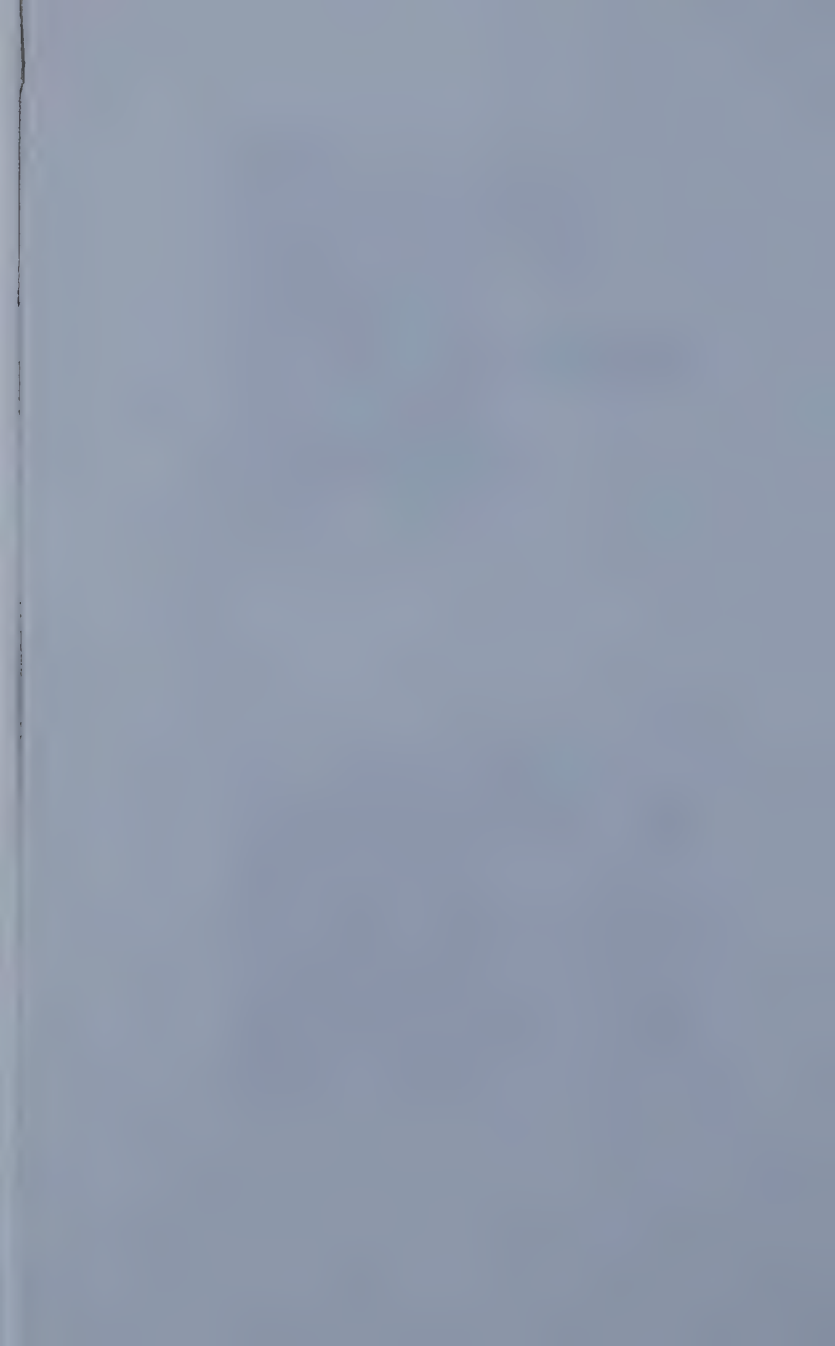


NORMAL STOMACH. View with a Stereoscope.





NORMAL COLON. View with a stereoscope.



acted upon by gravity, pulls the stomach over toward the left, where it lies in health well up beneath the ribs. When the body is in the upright position, unless the abdominal muscles are well drawn in, the stomach sags to the umbilicus or even an inch below; but when the chest is raised high and the abdominal muscles are well drawn in, the lower border of the stomach falls above the umbilicus, even when the body is in the erect position. In palpating or massaging the stomach it is important to bear these facts in mind, and in cases in which marked gastropnoxis exists it is important to ascertain the position of the lower border of the stomach, which in such cases may be found very low down on the left side, even below the crest of the ileum, when the patient lies upon the back.

The position of the stomach may be roughly determined by having the patient swallow half or two-thirds of a glass of water and then palpating the stomach in such a way as to agitate its contents. The best means of doing this is to touch the surface of the abdomen lightly with one hand, generally the left, which is placed over the stomach while short, quick movements are made with the right hand in such a way as to cause a succussion of the gastric contents. When this is done, the movement of the stomach contents may be felt, and often heard, and as the left hand is moved, it is easy to determine the point at which the movements are no longer felt. This is approximately the location of the lower border of the stomach. In cases in which the abdominal walls are tense and unyielding, the patient should be made to take deep breaths. During inspiration, relaxation of the abdominal muscles will occur and the movement of the stomach contents may then be easily felt. It is well to remember that for the success of this maneuver it is necessary that the stomach should contain both liquid and gas. When the stomach is full of either liquid or gas, no succussion sounds can be produced.

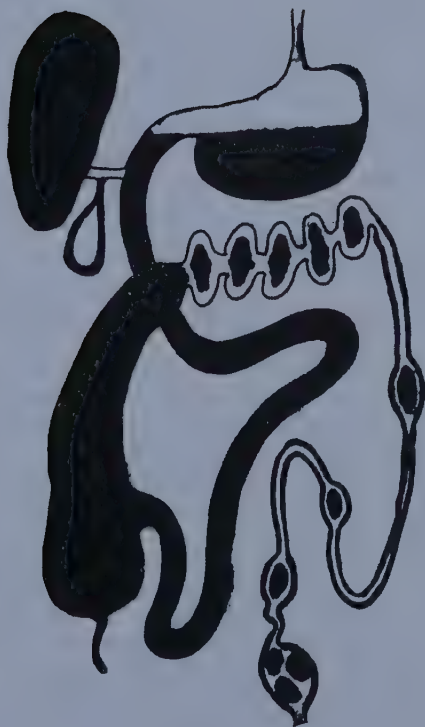
Visible Gastric Movements. It is important to be on the lookout for visible peristalsis of the stomach, which is likely to be seen in cases in which there is a considerable degree of obstruction at the outlet of the stomach. As the pyloric region is a very common seat of gastric ulcer and cancer, obstruction in this re-

gion is not uncommon. Gastric stasis may also result from adhesions or duodenal stasis produced by a mesenteric drag at the junction of the duodenum with the jejunum due to prolapse of the small intestine or the cecum, and from other causes. Visible gastric peristalsis invariably travels from the left toward the right. The wave of movement can be very readily seen when attention has been called to it. It is sometimes accompanied by sounds which are often the first symptoms to attract the patient's attention. Such cases usually require surgical treatment.

In massage of the stomach it is very important that the abdominal muscles should be perfectly relaxed, and care should be taken to follow the procedure which has been very fully described elsewhere in this book.

In cases in which the stomach is very large and very much prolapsed, it is often advantageous to have the patient lie upon the right side during the manipulation of the stomach. The operator stands behind. The patient's knees should be well drawn up and the patient supported in such a way as to relax the abdominal muscles as much as possible. When the purpose of the massage is to facilitate emptying of the stomach, it will be found very advantageous to have the patient take deep breaths during the manipulations. The descent of the diaphragm brings the stomach into a position which gives the hands a better opportunity to grasp it. The patient is made to hold the breath for a few seconds after filling the lungs, meanwhile making firm compression with the hands on anterior and lower portions of the stomach. By this means the gastric contents may be forced over against the pylorus and the emptying of the stomach greatly facilitated.

Palpation of the Colon. The application of massage to the colon is of so great importance in the treatment of constipation it is highly essential that the exact location of the organ should be known in each individual case. There is no other organ of the body the shape and location of which are so variable as is the case with the colon. The accompanying cut shows the colon in its normal position. The cecum lies in the right iliac fossa well



A CRIPPLED COLON.

Diagram showing the condition of the colon in chronic constipation as revealed by the X-ray. Spastic contraction of the colon due to colitis. Dilated cecum incompetent ileocecal valve, ileac and gastric stasis, inflammation of gall-bladder.



up above the brim of the true pelvis. The ascending colon occupies the right flank and ends with the hepatic flexure, which lies at the lower border of the ribs. The transverse colon, when in its normal position, crosses the body just above the umbilicus, ascending on the left side to the level of the spleen and sometimes reaching nearly to the diaphragm. The descending colon occupies the left flank and merges at the crest of the ileum in the iliac colon, the shortest portion of the canal, comprising that portion which lies across the iliac fossa, connecting at the brim of the pelvis with the pelvic colon, which at its lower extremity joins the rectum. The iliac colon and the pelvic colon together constitute the portion of the colon formerly known as the sigmoid loop.

The ascending colon, the descending colon and the iliac colon, which normally constitute the greater portion of the large intestine, are fixed against the abdominal wall and covered with peritoneum.

The cecum, the short pouch which falls below the junction of the small intestine with the colon, is normally free, as are also the transverse colon and the pelvic colon. The transverse colon and the pelvic colon possess such a degree of mobility that their position constantly changes with the changing conditions of the abdominal cavity. The transverse colon rises and falls with the ascent and descent of the diaphragm. The pelvic colon when empty lies collapsed and low down in the pelvis. It normally rises when filled. This rising and falling of the pelvic colon, first pointed out by O'Beirne in 1834, is a fact of much importance in the functioning of the colon and must be taken into consideration in the application of massage for the relief of constipation. When the empty pelvic colon falls backward, the effect is to form a fold at the junction of the pelvic colon with the rectum. As the pelvic colon is gradually filled, it rises and the fold disappears so that the fecal matters may move on from the pelvic colon into the rectum. When material enters the rectum from the pelvic colon, there is experienced in normal persons a desire for defecation. So long as the fecal matters remain in the pelvic colon, no desire for defecation is felt. Sometimes the

pelvic colon becomes impacted in the pelvis, so that it does not rise. In neglected cases this condition may become permanent by adhesions. In such cases a special procedure is necessary which will be described later.

In palpation of the colon the patient must lie with the hips and the head elevated by several pillows placed under the hips and one pillow under the head, care being taken that the pillow does not extend beneath the shoulders. By this means the anterior line of the trunk is shortened as much as possible and thus the abdominal muscles are relaxed. Standing on the patient's right side, both hands are placed upon the abdomen, with the fingers extended and the palms down. Gentle pressure is made upon the abdomen with the hands, and the tension of the walls is tested by pressure with the tips of the fingers, which in sensitive persons is sure to cause pain and to produce reflex contraction of the muscles. By firm pressure for a few seconds the tension which results from the patient's anticipation of being hurt will usually disappear, and even in cases in which the tension is very much exaggerated, continued firm pressure will usually succeed after a time, especially if the patient's mind can be diverted. Deep breathing also renders service by affording at least momentary relaxation at the instant when the expiratory movement changes to inspiration. Still taking care to avoid hurting or alarming the patient by too much pressure with the tips of the fingers, pressure is made on the right side over the cecum.

When the cecum is distended, especially when it contains considerable material, as is likely to be the case four or five hours after a meal, the cecum may be readily outlined. The sensation is that of pressure upon a cushion. Often gurgling sounds occur as the gas and liquid move about under pressure of the hands. As the hands move upward and pressure is made, the ascending colon may sometimes be felt, giving to the fingers the sensation of a rubber tube about the size of the thumb. This tube sensation is characteristic of colitis. The bowel is usually sensitive to pressure. This condition often exists in the cecum as well as the ascending colon, considerable pain being felt when pressure is made.

By careful manipulation about the lower end of the cecum, the appendix may often be outlined and is frequently found very sensitive to pressure. In these cases there are often adhesions of the colon, the result of an attack of appendicitis or pericolitis.

The rubber tube feeling is more frequently found in the descending colon and the iliac colon than in the ascending colon. This condition is also sometimes found in the transverse colon. Colitis is very frequently present in the pelvic colon, but is by no means so easily made out by palpation in this region. It is not easily possible to palpate the pelvic colon with any considerable degree of exactness, for the reason that the small intestines almost invariably overlies the pelvic colon, thus making it impossible to outline it. It is possible, however, to influence this portion of the gut by proper manipulations, which will be described later and which are highly important in dealing with some of the most obstinate cases of constipation.

Necessity for X-Ray Examinations as an Aid to Massage. In palpating the transverse colon the gut may be found anywhere between a point just above the umbilicus and the pubes. A portion of it may lie close to the abdominal wall, while another portion lies against the posterior wall of the trunk. Its mobility is so great it is in many cases not at all easy to locate it by palpation. It is only necessary to glance at the accompanying reproductions of radiographs, for which the writer is indebted to Doctor Case, the able roentgenologist of the Battle Creek Sanitarium X-Ray Laboratory, to note the absolute impossibility of exactly palpating the colon in a large number of cases without the aid of the information obtained by radiographs or fluoroscopic tracings made after a bismuth meal or after injection of the colon with a bismuth solution. Usually, both the bismuth meal and the colon injection are employed.

In order that the reader may obtain a proper conception of the position of the colon in the abdominal cavity and the relation of the colon to the abdominal wall, we are glad to be able to show two excellent stereoradiographs made by Doctor Case, who was first to perfect the stereoradiography of this portion of the

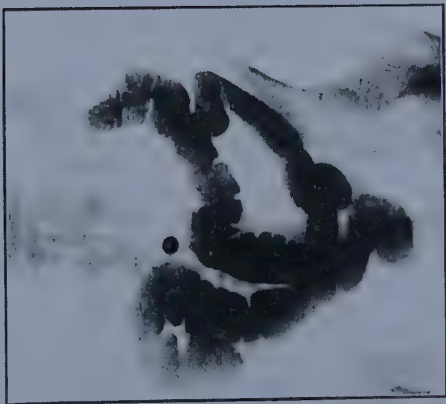
body. The reader is earnestly requested to make a careful study of these stereoradiographs by the aid of a stereoscope so as to get the picture of the colon well fixed in mind. In no other way is it possible to form a proper conception of the form of the organ and its relations. The reader is also asked to make a careful study of the selected radiographs herewith presented which fairly represent the several types of colonic distortion and displacement, which are commonly found in cases requiring the services of a masseur. The following types may be noted:

(a) Prolapse of the transverse colon. The prolapsed portion of the colon may have the form of a crescentic loop or may have a V-shape, forming at the center a very acute angle which may lie very low in the true pelvis. In cases in which great redundancy of the colon exists, the transverse colon may form two or more loops instead of one.

(b) The cecum may be greatly dilated or elongated and prolapsed. The cecum naturally lies upon a shelf of bone and muscle, which sustains its weight. When elongated so that it projects into the true pelvis, it is no longer supported and tends to become more and more dislocated and elongated, often dragging down the ascending colon after it and in many cases producing incompetency of the ileocecal valve, a condition which will be mentioned later. The dilated and elongated cecum becomes diseased as a result of the stasis of its contents, and appendicitis and adhesions with chronic pain in the right groin are among the results.

(c) Prolapse and adhesion of the hepatic fixure. This condition is sometimes accompanied by very chronic constipation, the result of obstruction at the hepatic flexure, due to a sharp fold or kink of the bowel and interference with the normal propulsive movements of the colon.

(d) Prolapse of the splenic fixure. This condition is much less common than prolapse of the hepatic fixure. It is, in fact, one of the most unusual of all the displacements of the bowel. It is the result of the long-continued drag of a badly prolapsed transverse colon and of various other causes which cannot be considered here. Sometimes a loop and kink occur in the region



REDUNDANT COLON AND PROLAPSE OF THE TRANSVERSE COLON.
View with a Stereoscope

of the splenic flexure, which present a mechanical obstruction to the onward movement of fecal matters and leads to very chronic constipation.

(e) Dilatation, prolapse and often impaction or adhesion of the pelvic colon. This is a common cause of the most obstinate constipation. Sometimes operation is required. Usually, relief by persevering effort is possible, if the directions for massage of the pelvic colon (226) are carefully followed. Since the writer devised this method some twelve years ago, it has been employed in several thousands of cases at the Battle Creek Sanitarium, where from 75 to 150 cases receive the treatment daily and with strikingly successful results. Occasionally cases are encountered in which the pelvic colon is so badly prolapsed and adherent that complete relief can not be obtained without an operation for breaking up the adhesions and suspending the pelvic colon by attaching it to the omentum, which is in turn attached to the abdominal wall, giving the pelvic colon a swinging support which prevents prolapse without immobilizing the gut.*

An Essential Point. It must be constantly borne in mind that massage of the colon, to be effective, must stimulate the colon to contraction. For this, deep pressure with the finger tips is necessary, and the pressure must be hard enough to cause slight pain, avoiding, however, much violent manipulation as to cause soreness lasting several days. Great care is necessary in cases giving a history of peritonitis or pelvic inflammation.

Before beginning a course of massage in a case of very chronic constipation, the patient should be required to submit to a thorough examination by a skilled roentgenologist, who should furnish to the masseur either reduced prints of his radiographs or life-sized tracings showing the form and position of the several parts of the colon. A careful study of the results of such a radiographic examination will enable the masseur to so direct his efforts as to accomplish definite and prompt results in cases in which only failure would result from treatment applied in the ordinary routine way.

* The New Procedure for Suspension of the Pelvic Colon, by John Harvey Kellogg, M. D., LL. D., F. A. C. S. *American Journal of Surgery*, April, 1917.

Massage of the Cecum and Ascending Colon. The patient is placed in an inclined position, head lowest. The hips must be elevated to a position as near 45 degrees as possible. By this means gravitation is made to assist, first, in emptying the cecum and ascending colon, and, second, in bringing the prolapsed parts back into normal position. It is not to be expected, of course, that the parts may be permanently restored to position by these manipulations, although some improvement in position may be reasonably looked for when the treatment is thoroughly and perseveringly applied. But the greatest benefit may be secured by the thorough emptying of the distended cecum and ascending colon, and by lifting up the hepatic flexure,, obstructive folds or kinks may be straightened out and thus the bowel may be emptied of its contents. Complete and frequent emptying is absolutely necessary to enable the bowel to recover its tone. The bowel must be emptied thoroughly three times a day by the use of proper dietetic and other means aided by massage.

In manipulating the cecum and ascending colon the hands of the masseur are placed upon the abdomen just above the pubes and Poupart's ligament (speaking anatomically). From this point the pressure is made in the direction of the ribs. The effect of the pressure may often be recognized by the occurrence of gurgling sounds and other evidence of the movement of gases and fluid or semi-fluid material in the bowel. One may often note a decided change in the form of a palpable and much distended cecum. It may be readily seen that the distended gut has been emptied of its contents, so that the cushion sensation has disappeared.

Massage of the Transverse Colon. After the cecum and ascending colon have been emptied, similar manipulations must be applied to the transverse colon which, in these cases, is nearly always prolapsed. (See radiographs.) For this purpose the two hands are placed in the center just above the pubes, and deep, firm pressure is made while the hands are slowly carried toward the sternum and lower costal margins. These movements for emptying the cecum and for replacement of the transverse colon are much facilitated by making the patient take deep breaths.

While the patient is breathing in, the hands are held firmly in position, then moved upward while the patient breathes out and at the same time draws in the abdominal muscles. With each exhalation the hands are moved upward an inch or two, then held firmly while the patient is inhaling, to be again moved upward (toward the ribs) as the patient exhales. By this means the diaphragm is made to co-operate with the hands in restoring the prolapsed viscera to position, a sort of rotation upward of the visceral mass being accomplished.

Massage of the Hepatic Flexure. In cases of prolapse of the hepatic flexure the movements of the hands must be directed toward the ribs of the right side.

Obstruction at the hepatic flexure is probably the chief cause of dilatation of the cecum and of incompetency of the ileocecal valve which often results. Hence it is of greatest importance to give thoroughgoing and intelligent attention to this part of the colon. Partial obstruction at the hepatic flexure may be the result of great prolapse and overloading of the transverse colon, a very common condition. The simplest form of obstruction is readily overcome by massage with the patient in the knee-chest position. Such patients must wear an efficient abdominal supporter constantly when on their feet, and should have the colon replaced and emptied daily by knee-chest position and massage.

In other cases the obstruction is due to a short loop or reduplication of the first part of the transverse colon. The prolapsed colon is sometimes adherent to the ascending colon, and may parallel its whole length. In cases of this sort, which are by no means uncommon, it is of the greatest importance that the fact should be known and regarded, as otherwise the efforts made to empty the colon may act in the opposite direction. In these cases care must be taken in massaging the cecum and ascending colon, to apply the hand well to the outer (right) border of the trunk. In many cases it is best to place the patient on the left side with the hips elevated. By working the hands in unison but in opposite directions, the ascending colon may be emptied and the contents pushed well along across the transverse colon.

When the splenic flexure is prolapsed, the movements should be toward the ribs of the left side.

Massage of the Water-filled Colon. The principal difficulty in the application of massage to the colon is to bring the organ within the grasp of the hand. Pressure may be easily applied to the cecum, the ascending colon, the descending colon and the iliac colon, excepting in unusual cases in which these portions of the intestine have become loosened from their attachment to the abdominal wall and greatly displaced. But the transverse colon and the pelvic colon, portions of the gut which it is highly important to deal with, are so movable and subject to so much variation in position, especially in cases of marked redundancy of the colon, that it is by no means easy to get them under control of the hand even when their location has been determined by means of an X-ray examination. The writer has found it possible to overcome this difficulty to a very considerable extent by filling the colon with water. When the colon is completely filled with water or air, it may often be seen quite clearly outlined upon the abdominal wall, and when thus filled the bowel may be much more easily grasped and manipulated by the hands than when empty or when only partially filled. Another advantage of distention of the bowel is the great ease with which the contents may be moved along. In chronic constipation the intestinal contents are not infrequently pasty and adhesive in consistency and cannot be readily pushed along the bowel even when the position of the intestine is such that it can be easily manipulated. Water softens the intestinal contents, loosens adhesive masses from the intestinal wall, and by distending the bowel greatly increases the effect of the manipulations in propelling onward the intestinal contents.

In preparing the bowel for massage of the water-filled colon, the patient should first receive an ordinary warm enema. After this has been discharged, another enema should be given which should consist of about three pints of a normal saline solution (one ounce of salt to the gallon of water or one dram to the pint). The temperature of the solution should be 102° F. It should be administered slowly and with the patient in the knee-

chest position or lying on the right side with the knees drawn up. The saline enema should be retained while the massage is being given. When it is desired to influence especially the cecum or the pelvic colon, the massage should be applied with the patient in the knee-chest position.

Massage of the Pelvic Colon. Massage of the water-filled colon has been found especially beneficial in cases of constipation due to stasis in the pelvic colon. In quite a large proportion of these cases the difficulty is due to backward displacement of the pelvic colon into the pelvis. By filling the pelvic colon with water and putting the patient in the knee-chest position, gravity is made to assist in getting the pelvic colon back into its normal position. So long as the colon remains in its prolapsed position, a mechanical obstruction is produced by a strong fold at the pelvi-rectal junction. When the pelvic colon rises, this fold is obliterated. No single procedure in abdominal massage has, in the writer's experience, been attended by such gratifying results as has massage of the pelvic colon with the patient in the knee-chest position. This is a standard procedure in the writer's practice and has been the means of affording relief in scores of most obstinate cases of constipation in which all other means had failed. In general, the patient's bowels move immediately after the treatment or within half an hour. Not infrequently it is found necessary to suspend the treatment to permit the patient to evacuate the bowel. After the bowels move, it is well to introduce a few ounces of paraffine oil in which is dissolved an ounce of malt sugar or sugar of milk (any syrupy extract of malt will answer the purpose), the object being to furnish food for acid-forming bacteria and hence prevent the growth of proteolytic bacteria, which, by producing indol and other toxins, paralyze the bowel, while the acids produced by acid-formers supply to the intestine its natural stimulus.

A remedy of great value in these cases is a whey culture of the *B. acidophilus*. This organism forms the dominant flora of milk-fed infants, as well as of calves and other milk-fed animals. The lactic acid produced by the *B. acidophilus* prevents the development of the colon bacillus and other putrefactive or-

ganisms and thus protects the intestine against these parasitic bacteria. Four to six ounces of culture introduced into the colon aids in changing the flora in the lower bowel and greatly facilitates the cure of colitis and proctitis which prevent the normal functioning of the gut. For radical relief the intestinal flora must be changed by the free use of acidophilus cultures, Lactose-Dextrine, or other efficient means, and a sufficient amount of roughage and lubrication (mineral oil preparations) should be employed to secure three bowel movements a day. If necessary, an enema should be used at night to be certain that the bowel is emptied before retiring. This aids in training the intestine to normal functioning.

This special manipulation for the pelvic colon the writer has found of very great value in relieving cases which has resisted every other means of treatment which could be brought to bear.

In cases in which the pelvic colon is prolapsed and adherent, and in which relief cannot be otherwise obtained, the abdomen may be opened by a competent surgeon, the adhesions broken up, and the pelvic colon lifted upward where it is maintained by attachment to the great omentum. This operation the author has employed successfully in a number of cases.

Massage of the Iliac Colon. The iliac colon is that portion of the gut which lies between the crest of the ilium and the brim of the true pelvis. It is that portion of the large intestine which lies in contact with the left ilium. According to the old nomenclature, the iliac colon constitutes the first part of the sigmoid flexure. This portion of the bowel, when filled with fecal matter or when the seat of colitis, as is frequently the case, may be easily palpated. It is felt under the finger as a long, roundish mass. When filled with feces it is large and doughy, and an indentation may be made in it by pressure with the finger. When colitis is present and the bowel is in a state of spasm in consequence, it has the feeling of a large and rather rigid rubber tube and is sensitive to pressure.

The iliac colon is a very common seat of stasis. Stagnation of feces in the iliac and pelvic colon exists in most cases of constipation. By proper manipulations the contents of the iliac

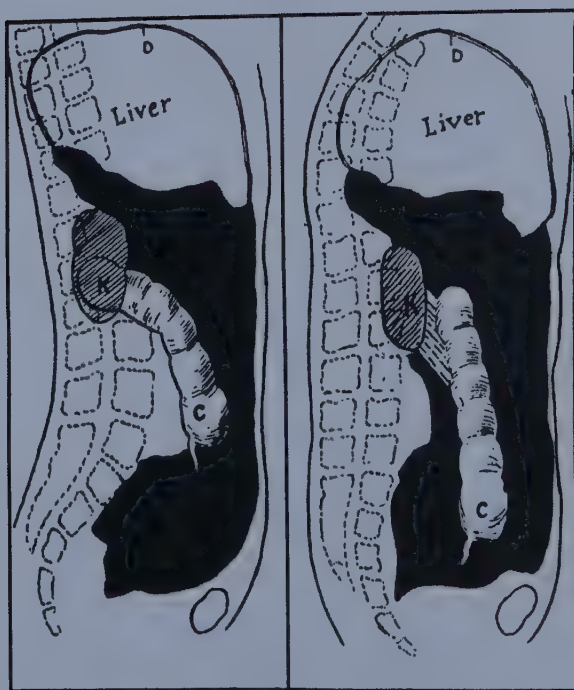


Diagram showing how a wrong sitting position causes prolapse of the colon.

colon may be passed on into the pelvic colon, and in not a few instances these manipulations will afford complete relief of constipation. Massage should not be applied when colitis is present, but only when the bowel is dilated and the seat of stasis. When colitis is present, fomentations, diathermy, or some other form of hot applications should be applied instead, and the moist compress should be worn over the abdomen at night and other measures necessary for relief of colitis should be employed.

The best position for the application of massage to the iliac colon is with the shoulders raised and the knees well drawn up. By this means the abdominal muscles are well relaxed. The masseur should stand on the right side of the patient and should massage the bowel with his right hand, if necessary using the left hand for reinforcement by applying it to the back of the right hand. The movements should at first consist of deep digital kneading, so as to break up the contents of the bowel, which at this point are likely to be considerably hardened, especially if some days have elapsed since the last bowel movement. After going over the whole length of the iliac colon, working from the crest of the ilium along down the groin to a point just above the pubes several times, deep pressure should be applied with the palmar surface of the fingers along the entire length of this portion of the bowel, moving the hands slowly from above downward, the purpose being to empty the bowel by forcing its contents onward into the pelvic colon. In terminating the movement, the fingers should be pressed as deep down as possible into the pelvis above the pubes, so as to reach, if possible, the first part of the pelvic colon. This can be easily accomplished in thin subjects, but in very fleshy persons with very tense abdominal walls it is not so easily done.

Persons suffering from constipation may often aid themselves by pressing with the hand in the left groin. Firm, deep pressure from above downward with the closed hand or with both hands often aids very materially in emptying the lower colon.

Massage in Cases of Patent Appendix. X-ray examinations made in the Roentgen laboratory of the Battle Creek Sanitarium after a bismuth meal have shown that the appendix is frequently

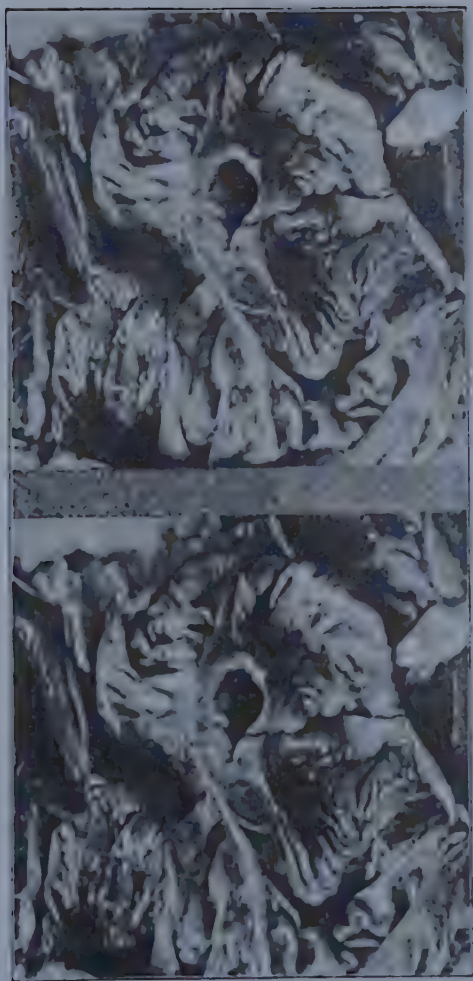
to be found in patent condition; that is, the valve which normally closes the entrance of the appendix against the contents of the colon is incompetent, so that the appendix becomes filled with fecal matters. This condition is one of disease, and only awaits the occasion when some neglect of the hygiene of the bowels or some indiscretion of diet produces an intense infection of the adjacent portion of the colon and in consequence an infection of the appendix and an acute attack of appendicitis. Persons in whom the appendix is patent are in constant danger of an attack of appendicitis and hence should take the greatest care to secure complete emptying of the colon and especially of the cecum. Such patients should be warned of their condition, and massage should be systematically employed so as to make sure that the cecum is kept constantly emptied that the appendix may be well drained instead of being distended with fecal matters forced in from the colon. When this is not done, feces may enter the appendix and form hardened masses, the irritation of which may easily light up an acute infection of the appendix.

Incompetency of the Ileocecal Valve. The importance of the function of the ileocecal valve has not been recognized until comparatively recent times. Even within a few years surgeons have described operations for complete obliteration of the ileocecal valve by means of an operation similar to the so-called Winney operation for the relief of pyloric sinuses.

The ileocecal valve is universally present in vertebrate animals. It separates the mid-gut from the end-gut, just as the pylorus separates the fore-gut from the mid-gut. It is as essential to the health and well-being of the animal body as is the pylorus.

The ileocecal valve was accidentally discovered by Bauhin in 1579. Its importance has not been appreciated, however, until recently, since its functions have become better known through the facility afforded for observing it by means of the X-ray and the bismuth meal.

The ileocecal valve is really a very wonderful structure. It is a double valve consisting of a muscular part, a true sphincter,



Stereoscopic View of an Incompetent Ileocecal Valve as Seen from the Inside.

and a mechanical part made up of two folds, which by falling together tightly close the opening from the colon side. The accompanying cuts show the form of the valve, and how the valve may become incompetent.

The ileocecal sphincter controls the movement of digested foodstuffs from the small intestine into the colon. The mechanical part of the valve prevents reflux of the putrefying contents of the colon into the small intestine. When the valve is incompetent, the infectious feces pass back into the small intestine.

Disorders Arising from Incompetency of the Ileocecal Valve. The following paragraphs are quoted from a paper prepared by the author on the ileocecal valve:

“W. Arbuthnot Lane, Surgeon in Chief of Guy’s Hospital, London, has called attention to the frequency of adhesions of the terminal portion of the ileum to the brim of the pelvis, forming what is known as Lane’s kink. Doctor Lane has also pointed out the numerous mischiefs which may be directly or indirectly traceable to the stasis in the small intestine arising from these kinks. He maintains that duodenal ulcer and even gastric ulcer may arise from this cause, and indeed expressed his belief that this is the most common cause of gastric and duodenal ulcer. Doctor Lane certainly presents a very considerable array of evidence in support of his views respecting the evils which may arise from the kink of the terminal portion of the ileum, and no one can witness the remarkable work done by this master surgeon in Guy’s Hospital, London, without feeling strongly impressed with the force of his contention; but Lane’s kink is itself an effect, and a question of much interest in this connection is, What is the cause of Lane’s kink?

“The writer has encountered cases which seem to indicate that in some instances adhesions of the terminal ileum may be the result of an extension of inflammation from an infected tube or ovary or an inflamed appendix. But these cases must be rare. In the majority of cases of Lane’s kink no such connection can be traced, and the most reasonable hypothesis is that the inflammations which give rise to fixation of the intestine are due to stasis of the intestinal contents and resulting inflammation of

the intestinal mucus membrane, which extends into the deeper structures of the wall of the gut and finally, reaching its surface, gives rise to an adhesive inflammation of the peritoneum. It is possible that this stasis may be the result of a spasm of the ileocecal sphincter, preventing the prompt discharge of the contents into the large intestine. On the other hand, it is plain that incompetency of the ileocecal valve may equally give rise to stasis in the terminal ileum through the reflux of the contents of the colon into the small intestine. The anti-peristaltic action of the transverse and ascending colon in the presence of an incompetent ileocecal valve not only prevents the ready discharge of the contents of the small intestine into the cecum, but forces back into the small intestine material which through the growth of proteolytic bacteria is often far advanced in putrefaction. There should be no putrefaction in the small intestine. Putrid fecal matter when held for some time in contact with the mucous membrane of the small intestine, which is less well prepared to defend itself against such infectious material than is the mucous membrane of the large intestine, leads to enteritis, which may result in adhesion.

“If this reasoning is correct, it is clear that incompetency of the ileocecal valve may be in many cases the primary factor in the production of the results which are attributed by Doctor Lane and his disciples to Lane’s kink. Enterocolitis, duodenitis and duodenal adhesions are but the natural result of the intestinal stasis which necessarily accompanies ileocecal incompetency. To the same cause may be attributed the adhesions about the duodenum resulting from stasis in this organ arising from the depressions of the duodeno-jejunal junction by the drag upon the root of the mesentery occasioned by overloading of the small intestine and the cecum. When the ileocecal valve is incompetent, the progressive forward movement of the digested food-stuffs is prevented, gases and liquid material oscillate back and forth between the small intestine and the small intestine becomes overloaded, and the unnatural drag upon the mesentery compresses the lower outlet of the duodenum as first pointed out by Byron Robinson and recently emphasized by Bloodgood. In

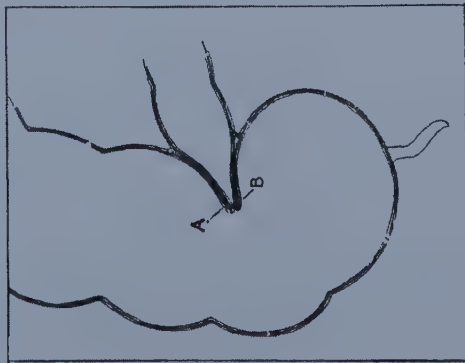


Diagram Showing Formation of the Lips of the Ileocecal Valve by Intussusception of the Ileum.



Diagram Showing Incompetency of the Ileocecal Valve Due to the destruction of one Lip by overstretching of the Gut.



Incompetency of the Ileocecal due to Destruction of both Lips, Due to Distortion of the Gut.

operating upon cases of this sort the writer has often found the stomach and duodenum enormously distended, while the jejunum was entirely empty as it should be, showing very marked compression at the duodeno-jejunal junction. On drawing the mesentery upward so as to relieve the traction upon its root, the distention of the duodenum disappeared at once and the jejunum became filled with gas."

Duodenal stasis and the infection resulting therefrom may not only lead to gastric ulcer, but through an extension of the infection may give rise to inflammatory processes in the biliary passages and the gallbladder and may even lead to the formation of gallstones. Pancreatitis may easily arise from the same cause.

The adhesions between the duodenum and the gallbladder, liver and stomach may give rise to pain and to various forms of gastric disturbance. Adhesions which distort and flex the pylorus may lead to abnormally quick emptying of the stomach; whereas, other adhesions may obstruct the outlet of the normal opening of the pylorus and thus cause gastric stasis. Through the prolonged retention of food in the stomach may be produced hyperacidity, gastritis, indigestion, even ulceration and atony. These conditions are a predisposing cause of cancer, which very frequently develops on the cicatricial remains of an old gastric ulcer.

Both diarrhea and constipation may be the result of incompetency of the ileocecal valve. As pointed out by Max Hertz many years ago, ileocecal incompetency may be both a cause and a result of constipation. It may cause constipation by preventing the normal onward march of food residues which enter the colon from the small intestine. Ileocecal incompetency may cause diarrhea by permitting the ready passage of imperfectly digested foodstuffs from the small intestine into the colon.

Finally, incompetency of the ileocecal valve may be justly regarded as an active factor in many cases of profound intestinal autointoxication. The constant forward movement of matters from the small intestine into the colon which is the result of strong peristaltic waves which sweep along the small intestine during digestion, by maintaining a continual movement toward

the colon restricts the putrefaction to the colon and prevents an extension of the infection backward into the small intestine. But when the ileocecal valve becomes incompetent, the free movement of gases and liquids from the colon into the small intestine under the influence of powerful antiperistaltic waves may force the putrescent matters from the colon many feet backward along the small intestine. The great absorbing power of the mucous membrane of the small intestine renders this condition most favorable for producing the most profound toxemia, which may manifest itself according to individual susceptibilities and idiosyncrasies, as a chronic rheumatism or rheumatoid arthritis, an exophthalmic goiter, attacks of migraine, eczema or psoriasis, bronchitis, hepatic enlargement and sclerosis, splanchnic arteriosclerosis, so-called neurasthenia, and a great variety of other symptoms which are attributed by Bouchard, Combe and others, doubtless with good reason, to autointoxication.

The evil effects of incompetency of the valve are, of course, most likely to appear when constipation exists as this often causes exaggerated antiperistalsis as well as mechanical distention of the colon and so a greater tendency to overflow and reflux into the small intestine.

While certain cases of incompetency of the ileocecal valve can be permanently cured only by surgical means,* a very considerable number of cases may without doubt be substantially relieved and some perhaps cured by persevering application of massage in connection with proper diet and the establishment of correct bowel habits. Within the last few years the writer has perfected methods of changing the flora which are so efficient and prompt in their action that operation for repair of the incompetent ileocecal valve is seldom found to be required. Changing the flora not only stimulates the activity of the intes-

* See the following papers by the author:

"Incompetency of the Ileocecal Valve vs. Lane's Kink as a Cause of Ileal Stasis"

"Surgery of the Ileocecal Valve." (A Method of Repairing an Incompetent Ileocecal Valve and a Method of Constructing an Artificial Ileocolic Valve.)

"Incompetency of the Ileocecal Valve—Disorders Arising from This Condition and Their Treatment"

"Incompetency of the Ileocecal Valve the Most Common Cause of Ileal Stasis."

tine, and thus prevents the delay which gives opportunity for putrefaction, but also prevents the development of the Welch's bacillus and other putrefactive organisms. As a result, indol, skatol and other putrefaction products are no longer found in the colon, and if reflux of colon contents into the small intestine occurs, no harm is done for there are no toxic matters to be absorbed.

The existence of incompetency of the ileocecal valve is readily shown by a radiographic examination. When the colon is injected with bismuth solution, the solution does not stop at the ileocecal valve as in normal cases. It may be seen ascending considerable distance upward along the small intestine. Doctor Case reports one case in which the bismuth solution passed the whole length of the small intestine, reaching even to the duodenum.

It is possible, even in the absence of an X-ray examination, to find very convincing evidence of the existence of incompetency of the ileocecal valve. When the valve is incompetent, it is possible to force gas and liquid from the colon into the small intestine by firm pressure made upon and along the ascending colon and cecum. When this is done, sounds may be heard in the region of the ileocecal valve, and by percussion of the colon and small intestine before and after the manipulation, a change in resonance over the central portion of the abdomen will be found as a result of the backward movement of gas and liquids. An examination of this sort requires the services of an expert. In general, the X-ray examination must be relied upon as the only sure method of diagnosis.

When a condition of incompetency of the ileocecal valve has been shown to be present, the patient should be subjected to the manipulations which have been described for emptying the cecum and ascending colon. If the hepatic flexure or transverse colon are prolapsed, these parts must be restored to position by careful manipulation, and the bowels must be thoroughly emptied *three times a day*. If necessary, the assistance of a cool enema, 80 to 70 degrees, should be employed and especial attention should be given to the diet. Foods inclined to increase intestinal autoin-

toxication should be avoided. A well adjusted abdominal supporter must be worn.

Accessory Measures. In the treatment of cases of constipation, it is necessary to keep constantly in mind the fact that a prolapsed, redundant or atonic colon is not simply a cause of constipation but also a result of it, and that the treatment of cases of this sort will never be attended by complete success unless all the causes present are considered. In "Colon Hygiene" the writer has dealt at length with the subject of constipation and has presented an outline of methods by means of which practically every case of constipation may be cured, with the understanding, however, that by a cure is meant the securing of *normal* bowel movements by the use of non-medical means and without constant resort to the use of the enema and by the application of measures which are in themselves entirely harmless and may be employed for an indefinite length of time. It is of course understood that there are a few cases of chronic constipation in which the condition is a result of mechanical causes which can only be removed by surgical means. Even these cases practically always require the continued use after operation of non-surgical measures in order to prevent relapse. The measures which the writer regards as essential in the treatment of constipation, whether massage is employed or not, are the following:

1. An antitoxic diet; that is, a diet consisting largely of fresh vegetables, with abundant use of fresh fruits, lettuce, cucumbers, and similar fresh and bulky foods, with milk, cereals and nuts.

2. The use of sufficient bulk and lubrication to insure prompt dismissal of the residues of each meal. For roughage bran and agar are most efficient. Greens, lettuce, celery and all sorts of fresh vegetables are also valuable. Artificial lubrication is also needed. The normal lubricant of the intestine is mucus. In chronic constipation the normal mucus is often deficient in quantity or is replaced by a thick, opaque and adhesive secretion characteristic of colitis. All mineral oils are valuable. The heavier oils are preferable to the lighter varieties,

and the best of all is a paraffin which melts near the body temperature, being solid at ordinary temperatures. Ordinary paraffin oil does not readily mix with the foodstuffs and passes through the intestine by itself and so is inefficient as a lubricant. The paraffin with a higher melting point (100° - 105°) readily mixes with the food and remains with the food residues in the colon, facilitating their movement along the intestine, and is thus more efficient as a laxative. Ordinary paraffin oils are also objectionable because they are liable to escape from the anus without the patient's knowledge, soiling the clothing and giving rise to other inconveniences, among which is an intolerable itching of the skin of the anal region.

Both roughage and lubrication are required for every meal. The effect of these agents is not that of a laxative. They produce no irritation and are efficient only when actually present with the food residues in the colon. It is to be remembered, also, that solid substances after being swallowed are not thoroughly mixed in the stomach, or even in the colon, but in general pass through the intestine in the order in which they are swallowed.

3. Change of the intestinal flora is important in every case of constipation. By this means the putrefaction products which paralyze the colon will be suppressed and the intestine will be supplied with its normal acid stimuli which are produced by the *B. acidophilus* and other acidophile organisms with which the putrefactive flora are replaced.

After careful study of the subject, the writer has become thoroughly convinced that *the bowels normally should move at least three times a day*. This may generally be accomplished even in very chronic cases of constipation by the employment of massage and the means above suggested.

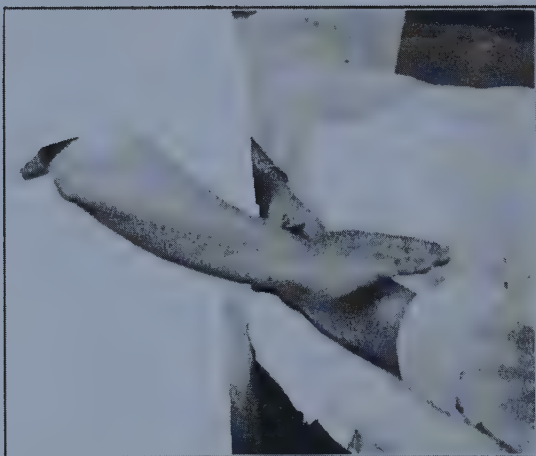
The intestinal flora (bacteria) must be changed. The normal flora of the colon forms acids, which are a normal stimulant to the colon. These acid-formers are by an unnatural diet displaced by putrefaction germs which produce poisons by which the bowel is paralyzed and becomes elongated, dilated, "kinked" and the seat of colitis. To change the flora, meats of all kinds, and sometimes even eggs must be avoided. Yogurt buttermilk should

take the place of ordinary milk, and yogurt tablets should be taken before each meal.

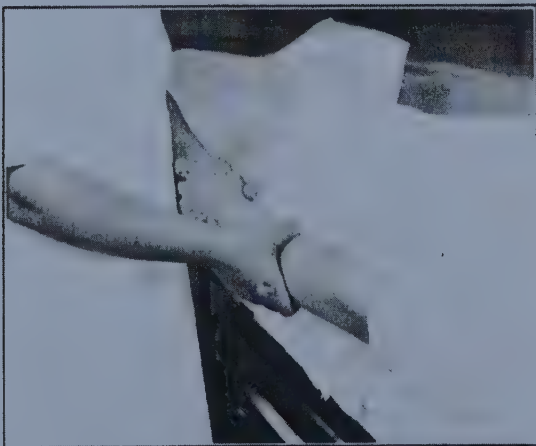
It is also essential that the normal rhythm of the bowels should be restored. This requires three or four evacuations of the colon daily. By the thorough application of colon massage, aided by an antitoxic and laxative diet and other means, this may be accomplished. The intestinal flora must be changed and the lost functions of the colon restored. Massage alone, without the measures referred to, never secures more than partial and temporary results.

The details of the accessory measures essential to success in the treatment of chronic constipation are given in other works by the author, to which the reader is referred.*

* "Colon Hygiene," "Autointoxication," "The Itinerary of a Breakfast" Modern Medicine Pub. Co., Battle Creek, Michigan.



Position of the hand in starting



Second Position

Massage in the Treatment of Fractures

NEARLY ever since the introduction of massage into medical practice its essential value as a means of removing the unpleasant effects of fracture and other traumatisms of bones and joints has been recognized by leading surgeons and to an increasing degree by the profession at large. Massage and movements have indeed offered the only means by which the function of muscles, tendons and joints impaired by injury or by long inactivity could be rapidly and completely restored. In not a few instances, however, it has been found that the most persevering application of massage and movements has failed to completely restore the function of parts which have been long immobilized. Gradually surgeons have come to recognize the fact that the method of dealing with fractures has been such as to aggravate rather than to remove certain of the effects of injuries of this sort. In dealing with fractures surgeons have had their eyes fixed too closely upon the injured bone and have neglected to consider the importance of dealing with the injuries inflicted by the traumatism upon the soft parts adjacent to the fracture, and have to a still greater degree neglected to take the necessary precautions to avoid inflicting still further injury by the means adopted for the restoration of the injured bone.

Within the last twenty-five years an increasing number of surgeons have come to recognize the unsatisfactory character of the methods of dealing with fractures, and Mr. Arbuthnot Lane, the leading surgeon of Guy's Hospital, London, has even gone so far as to say, "the treatment of fractures as it exists at present is a disgrace to surgical practice."

When starting out in the practice of medicine now nearly forty years ago, the writer recognized the necessity for some modification of the methods of treating fractures then in vogue, and which for the most part are still practiced, and adopted as a routine measure the plan of treating hydropically every case of fracture in which the conditions were not such as to demand immediate surgical interference. The plan instituted at that

time by the writer and which has been in vogue ever since in the Surgical Department of the Battle Creek Sanitarium was to place the injured limb in a position of as complete rest as possible and then to apply very hot compresses (fomentations) or alternate hot and cold compresses until the pain was relieved and swelling diminished. It was found that this method greatly facilitated the manipulation of the displaced fragments, relieved the patient's suffering and lessened the amount of exudate in the soft parts, and hence to a large degree prevented the adhesion of tendons and the consequent impairment of function in the injured part.

Estradere, one of the earliest writers on the subject of massage, long ago (1863) called attention to the fact that massage is a very powerful remedy against the muscular atrophy, contractions, adhesions of tendons, stiffness of joints and synovial swellings which result from fractures. He insisted that by the employment of massage the vegetative life of the injured limb might be stimulated and thereby the injurious effects of long inactivity might be prevented. "I say even more," said this sagacious author, "the activity of the general functions of the limb will increase the vitality of the bone. The regeneration of the bony structures will thus be favorably influenced and the callus will be developed more rapidly and will become more solid."

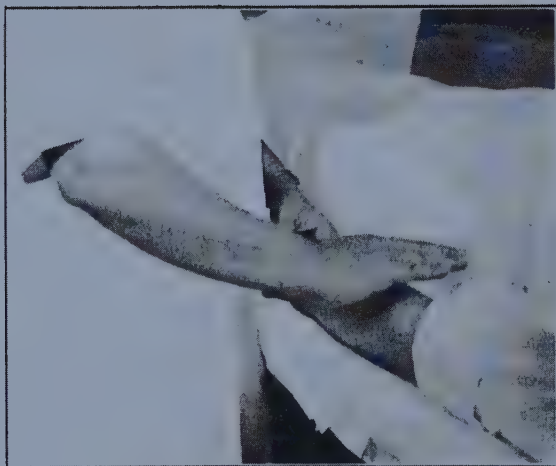
Two years later, M. Bizet recommended massage as a means of greatly hastening the cure in cases of fracture.

Lucas-Champoniere reported cases of fracture successfully treated by massage as long ago as 1886, from which time on the method gradually grew in favor.

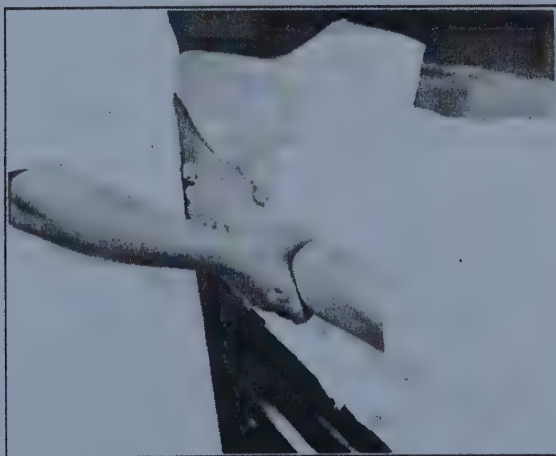
G. Wharton Hood had previously made a careful study of the methods of the "bone-setters" and had shown that some of their methods which have been passed down from one generation to another from earliest times are highly useful.

Experiments made by Cornial and Coudray upon animals whose bones were fractured and afterward treated in various ways, led them to the following conclusions:

* Estradere: *Massage*, 1884, page 190



Position of the hand at the end of the stroke.



Stroking the under side of the forearm.

1. When movements were administered to the injured limbs with the definite purpose of hindering the formation of callus the very opposite effect was produced. That is, the amount of callus produced was increased.

2. On the other hand, when fractured bones were placed in splints in such a way as to hold them immovably in position, the formation of callus with union of the bones was hindered.

3. It was found impossible to prevent the union of the fragments by movements unless the movements were so violent and extensive as to force the fragments entirely out of line and to destroy contact of the injured ends.

These and other experiments have clearly established the fact that a slight degree of movement of the ends of the fragments encourages rather than hinders the formation of callus.

Dr. Lucas-Champoniere, of France, who has been the chief champion of the massage method of treatment of fractures, has clearly demonstrated by an enormous mass of clinical evidence that the small amount of movement of the fragments produced by massage and carefully executed movements in the treatment of fractures is highly beneficial and promotes healing rather than non-union.

Neuell, who adopted the method of Lucas-Champoniere, confirms this experience. The advantages to be gained by massage may be briefly summarized as follows:

1. Immediate relief of pain.
2. Relief of muscular spasm which not only contributes to the relief of pain but greatly facilitates the restoration of fragments to the normal position.
3. Relief of swelling by encouraging the lymph and blood circulation of the affected parts.
4. More complete and rapid formation of callus.
5. More rapid and perfect restoration of the normal functions of the affected part.
6. Greater certainty of complete and permanent repair of the injured bone.

GENERAL METHOD OF APPLYING MASSAGE AND MOVEMENTS IN FRACTURES

First of all, it should be stated that in the treatment of fractures by means of massage, it should not be understood that splints and other appliances which are ordinarily employed are to be neglected. Massage does not take the place of any of the mechanical means which are ordinarily employed in fractures for the support of the injured parts but is a supplementary method, the purpose of which is to facilitate the end sought by older methods of treatment and to obviate the injurious effects which result from the long continued inactivity necessitated by the extension method and the continuous application of splints and bandages of various sorts.

The massage procedures employed differ very greatly according to the requirement of individual cases and especially according to the stage of repair which the case has reached. The procedures employed are the following:

1. Gentle stroking for the relief of pain and muscular spasms.
2. Gentle manipulation of the parts near the seat of fracture, such as adjacent joints, fingers, toes, etc.
3. More vigorous massage applied after the bones have united for the purpose of bringing the parts into full and perfect activity, such as deep kneading and joint flexion.
4. Varied, graduated and sometimes vigorous application of nearly all different massage procedures and movements in those cases which have suffered through the immobilization of the old methods of treating fractures.

The first purpose of applying massage in cases of fracture is to relieve the pain, muscular spasm and swelling which are the result of the injury. The procedure required by this is light stroking performed in a slow and perfect regular manner. The fractured limb is placed in a position of the most complete rest possible. Except in very unusual and extraordinary cases and in compound or open fractures, no immediate attempt is made to restore the fragments to normal position. In many cases this can only be accomplished by the administration of an anesthetic on

account of the muscular spasm produced by the irritation of the injury which brings the full force of strong muscles to bear in holding the fragments in the position into which they have been forced by the accident. The fractured limb being placed in a position of rest, the masseur seats himself in an easy position which he can maintain without strain or fatigue, and begins making light movements over the surface of the fractured limb. The stroking starts with passes over the limb, not touching it. Gradually the hand approaches the surface as it passes back and forth over the limb two or three times until finally the very slightest contact is made. To prevent the slightest jar at the beginning and at the end of the stroke, the hand is made to move a short distance without contact before actually touching the skin, and at the end of the stroke the movement of the hand continues on for a short distance after contact ceases so that the making and breaking of contact with the skin is with the hand moving.

The chief contact in stroking is made by the palmar surfaces of the two or three middle fingers. Contact is sometimes made with the thumb and little finger also. A most important point is that the movements shall be made with perfect regularity. The number of movements per minute depends upon the length of the stroke. Ordinarily the rate is ten or twelve strokes per minute. When long strokes are made, as in treating the thigh, the rate may be not more than five or six strokes per minute.

The ordinary duration of the application should be ten to fifteen minutes. The rule is to continue until pain is relieved or until it is evident that other means must be adopted for relief of the pain. This can usually be accomplished within the time mentioned.

When the pain is relieved it will be found that the muscular spasm has also disappeared. The muscle instead of being tense, firm, perhaps forming a bunch of considerable size which is hard and sensitive to the touch, is found soft, relaxed, yielding easily to the touch, and not sensitive. The changes that take place under the gentle stroking described are little short of marvelous. The patients are sometimes very apprehensive at the beginning

of treatment, but after a single experience they are most appreciative of the relief given and are glad to receive the treatment.

In cases in which relief is not promptly afforded by the treatment described, flannel cloths wrung out of hot water, or fomentations, should be applied over the parts. The hot cloths should be large enough to cover the entire limb. After two or three applications of three to five minutes each, a cheesecloth compress eight or ten inches wide, long enough to cover the limb and made up of ten or fifteen thicknesses of cheesecloth, should be wrung dry as possible out of cold water (temperature 50°-60°) and laid upon the limb. A covering of mackintosh and several thick layers of flannel are applied over the compress which quickly becomes warm and has the soothing effect of a poultice. After a half hour or so the stroking may be renewed and generally with better effect if it has at first failed to give relief.

When both massage and fomentations fail to relieve the pain and to make it possible to bring the fragments into line with gentle manipulation, an anesthetic must be given and the fragments replaced under the guidance of the X-ray if possible.

Each day the splints should be removed under the supervision of the physician and the stroking should be renewed for fifteen or twenty minutes. By this means the circulation of the blood and lymph will be well maintained and adhesions of tendons and fascia will be prevented.

After pain, spasm and swelling have been relieved by the treatment above suggested, proper splints of extension should be applied. This of course must be done by a competent surgeon and should never be attempted by a nurse or masseur except in emergency. It is of course understood that all treatment of fractures by massage must be done either by the physician himself or by a nurse under the immediate supervision of a skilled and qualified physician.

When the fracture involves small bones, stroking may be done by a single finger or by the thumbs working in co-operation.

Great care must be taken to avoid moving the fragments more than is absolutely necessary and to make sure that no displace-

ment occurs. At first only the upper splint will be removed, the lower splint being retained in place so as to avoid any possibility of disturbing the fragments.

After the first week, slightly more vigorous procedures may be employed, such as gentle palm kneading and very light petrissage. By the third week the fragments will be well united, and then various forms of deep kneading may be employed, care still being taken not to disturb the fragments.

It is well to lubricate the surfaces of the skin by the free application of paraffin oil or talcum powder. Vaseline, cold cream and other adhesive lubricants should not be used. When there is a thick growth of hair upon the skin this may be shaved off if necessary to avoid friction. It is highly important that there should be no friction to prevent the smooth gliding of the hand over the surface.

After the third week the massage may be given only every other day for a week or two, then twice a week, and finally once a week.

Active and passive movements are nearly as important as massage proper. At first only passive movements are employed. These are of special use in cases of fractures of the arm bones. The first day the fingers should be carefully flexed and extended, first one finger at a time, then all together. After the second day the patient is allowed to make slight resistance while the fingers are flexed and extended. Resistance should not be great, just barely sufficient to be felt by the masseur. After two or three days the finger movements should be more vigorous and more extensive. It is not always necessary that the flexion of the fingers should be complete. It is more important that many slight movements should be made than that the movements should be very great in amplitude. The amplitude may be increased from day to day, care being taken always to stop short of producing pain.

The movements should be as great as possible in variety, that is, each joint should be moved in all possible directions. No movement should be attempted which could possibly tend to the production of deformity. It is especially important to remember

this in the treatment of Colles' fracture. No attempt should be made to flex the wrist backward until after good union of bone has occurred. When the parts are so sensitive that any attempt at massage or movements causes pain the parts should be allowed to rest for a day or even two days. A thorough fomentation and heating compress should be applied instead of massage.

The fomentation may be applied once a day and the heating compress kept on during the interval, especially when there is much pain or swelling. The splint should be applied over the compress. It is in many cases well to combine the massage and movements. After stroking the parts for a few minutes, a few gentle movements are executed, then stroking is given again. This is continued until each joint has been sufficiently exercised.

Considerable difficulty is sometimes experienced in preventing the resistance of the patient when giving the passive movements. Any attempt at haste will aggravate this difficulty. The masseur needs the greatest patience, gentleness and tact in dealing with this class of cases.

After the first week, the patient may make slight active movements such as slightly contracting the fingers or slowly bending the elbow or moving the shoulder, but the patient should not attempt to make any use of his limb even in the smallest way until after the ends of the bone are thoroughly knit together. The active movements must at first be very slight, barely sufficient so as to be visible. These slight movements many times repeated are of more importance to the patient than great amplitude of movement to insure against the evils which arise from inactivity. The patient may be made to execute a considerable variety of active movements, one of the most useful in thrumming on the table, executing five finger movements as in piano practice, slowly extending and contracting the fingers, etc.

CONTRAINDICATIONS

Massage in fractures is contraindicated in the treatment of fractures in certain condititons which should be well borne in mind, especially the following:

1. When the skin is broken, or when it is the seat of a

dermatitis, and in cases of compound fracture in which an infection of the wound has occurred. It is possible, however, in many of these cases to apply massage with great benefit at a little distance above and below the wound.

2. Excessive mobility of the fragments. Massage should not be undertaken until the bones have been well knit together, say after the third week. Even in these cases, however, massage may be applied with benefit to the parts above and below the seat of fracture, as for example to the fingers and upper arm in cases of fractures of the forearm. With the exercise of sufficient care massage may be applied even when there is a considerable degree of mobility.

3. In cases in which Lane's plates are employed. In these cases a complete application of massage cannot be made, but gentle stroking above and below the wound may be very useful in relieving pain and promoting the circulation and hence encouraging the formation of callus.

4. Great age. In general, massage is thought to be contraindicated in cases of very aged persons, yet it may be found useful as a means of relieving pain even in these cases, and it seems reasonable that judiciously applied massage may encourage the formation of callus in these cases in which repair is likely to be delayed or incomplete.

5. In cases of fracture in young children, massage is less needed than in adults for the reason that in these cases, the bone never fails to develop abundant callus, and the tendency is rather to the excessive formation of callus. Children too are likely to resist the treatment and are often so unruly that the removal of the splints or other support is hazardous. In the case of docile and intelligent children, however, massage may often be found very useful as a means of relieving pain and muscular spasm, and hence may contribute much to the comfort and welfare of the little patient.

6. Spontaneous fracture. In cases of spontaneous fracture in case of malignant disease of the bones or atrophic changes due to tabes, massage cannot be expected to accomplish much toward insuring repair, but even in these unpromising cases massage

affords the patient much comfort by relieving pain and spasm and may thus aid in the replacement of the fragments.

It is important to emphasize again in this connection the fact that massage in connection with fractures generally means something entirely different from ordinary massage. It is usually nothing more than very gentle stroking, barely touching the surface.

Finally, attention should be called to the importance of gentle massage and passive movements for other parts of the body aside from the injured limb as a means of combating the injurious effects of the enforced idleness, which is usually the result of the injury which produced the fracture. Idleness alone is capable of producing constipation, loss of appetite, general low vital resistance, and impaired health, especially in a person whose habits have been active. Daily cold mitten frictions followed by general and abdominal massage with deep breathing exercises and such other movements as can be taken without displacing the injured member are of very great service.

MASSAGE IN SPECIAL FRACTURES

In the application of massage to fractures in different parts of the body various slight modifications are necessary. Skill in these minute details can only be acquired by experience. A masseur who desires to make a specialty of treating fractures by massage in connection with hospital or dispensary practice should make himself familiar with the works of Lucas-Champoniere and Mennell, and should make a special study of the anatomy of the arms and legs.

The Mobilization of Joints

Stiffness or ankylosis of joints is one of the common conditions for the relief of which the services of a masseur are sought. To deal wisely with cases of this sort requires far more skill and experience than do the ordinary manipulations of massage. A stiff or ankylosed joint is not only restricted in its movements, but it is also the seat of disease.

The diseased condition may be either primary or secondary. When the disease of the joint is primary, it may be the result of injury, as a wound, a bruise, a sprain; or of infection in connection with some infectious disease, as acute rheumatism, gonorrhea, or erythema nodosum; or its origin may be a focal infection of the tonsils, teeth, gallbladder, colon, cervix uteri, or some other part. In a very large number, perhaps the majority of cases, however, stiff or rigid joints are the result of the prolonged immobility incidental to the treatment of an injury to some neighboring part, as a fracture of a bone or a gunshot or other wound of soft parts. So long ago as 1841 Teissier, of Lyons, France, called attention to the injurious effects of prolonged inactivity of joints. He summarized the effects of immobility as follows:

“(1) A sero-sanguinolent exudation which may even develop into a purely sanguinolent extravasation which takes the place of the normal synovial secretion of the joints. This extravasation may occur not only in the synovial cavity but it may extend to the soft parts outside of the capsule, the sub-synovial cellular tissue, the muscular tissue and even the skin.

“(2) This sero-sanguinolent extravasation later undergoes a fibrous transformation and forms false intra-articular membranes.

“(3) Soon the articulation itself suffers the disastrous results of this extravasation, the cartilages of the articulations become dry, rough and rugged.

“(4) Finally the cartilages atrophy and unite and complete ankylosis of the articulation occurs.”

A little later Bonnet (1844) maintained that immobility of joints should be the practice only in cases of acute inflammation accompanied by sharp pain and in chronic cases in which a cure could be accomplished only by ankylosis. More than forty years ago Lucas-Championniere, surgeon-general of the French army, began advocating the mobilization of joints in the treatment of fractures and wrote several important treatises upon the subject, one of which, *Precis du Traitement des Fractures par le Massage et la Mobilization* (1895), long remained the one classical dissertation upon this question. This authority holds in relation to the injurious effects upon a joint of prolonged rest: "When a joint does not functionate it becomes the seat of stiffening and is often incurable. The articulating surface loses its smoothness, the cartilages become denuded, and the immobilized joint rapidly progresses toward destruction of its function; the tissues become infiltrated and lose their suppleness."

The views of these eminent French authors have been adopted by a few progressive surgeons, but, unfortunately, they are as yet so little disseminated among American surgeons that great numbers of cases of joint rigidity and stiffness are encountered which are the result of injuries, such as fractures or other traumatisms of neighboring parts, and which might easily have been prevented if proper mobilization had been employed at the beginning. Yet through neglect these cases have become so gravely diseased that, even if they are not hopeless, complete restoration of function is impossible.

French surgeons have developed the art of joint mobilization to a high degree of perfection. During the late war, particularly, great advancement was made in the methods of manipulation and definite principles were established. These are very well set forth by Aide-Major Dr. P. Kouindjy of the Hospital Salpêtrière, Paris, in his classical work, *La Kinésithérapie de Guerre*, of which in the following paragraphs we present an abstract:

Prolonged immobility is a danger in all cases of traumatism of the limbs. It has a disastrous effect not only upon the injured

joint, but also upon neighboring articulations. We have encountered many examples of fractures and even advanced ankylosis of the shoulder. A fracture of the femur may terminate in ankylosis either of the hip and the knee or of the ankle. Solely to lack of proper mobilization must be attributed the great number of war cripples. "Movement is necessary for the repair of the injured parts," wrote Lucas-Championnière. When a limb is fractured the resulting disorders are complex and involve the bones, the muscles, the fibrous tissues or tendons, and the joints. The repair of these different parts must occur simultaneously. Mobilization is a condition most favorable for the repair of these various structures, while immobilization is the worst possible condition. Thus mobilization is the one means indispensable in combating the evil effects of too prolonged immobilization.

But in order to secure through mobilization all the advantages we desire, it is necessary that it be applied at the right time and in the right way. It should be progressive, gradual, and rhythmic. One should always commence with very slight movements. The extent of the movements should be slowly increased in accordance with the results obtained in each case, the increase in the amplitude of the movements being very gradual. All shocks and brusqueness should be avoided, care being taken not to produce harmful pain. Severe pain must always be avoided, and the movements kept within the limits of bearable pain. Of course, one need not hesitate to administer a proper movement because it produces a disagreeable sensation. Articular sensibility is a subjective phenomenon which varies greatly in different persons. Pain due to congestion following the treatment should determine the vigor of the application rather than the subjective pain. The employment of all excess of force incurs the risk of setting up a subacute or even an acute arthritis by which the cure may be very greatly delayed.

Systematic mobilization comprises two distinct procedures, namely, manual mobilization, or mobilization proper, and mechanical mobilization, the so-called mechanotherapy. Manual mobilization is an essential feature for the reason that by the

hand alone can the mobilization be graduated with the desired degree of exactness. Manual mobilization may be executed at any time when required, which is not true of mechanical mobilization.

For the efficient application of mobilization, certain conditions are indispensable. First, the operator should feel at ease. The movements of the arms should be free and the hands supple. He should assure himself that the patient has no fever and that he has no other indispositions which may unfavorably influence the treatment. The patient should be in a position most favorable for obtaining the maximum effect with a minimum of effort. The patient should be allowed to place himself in the position he finds the most comfortable. If the dressings have not yet been removed from the wound and it is desired to mobilize articulations distal to the wound, the patient should remain in bed if he is still a bed patient; sitting, if he is sitting up; and neither the dressing nor the affected joint should be disturbed. The distal joint is manipulated with great care to avoid disturbance of the injured joint. If, on the other hand, the wound has healed, the callus formed, and the dressing has been removed, the patient may be placed in the position most convenient for applying the treatment, either lying in bed or sitting upon the edge of the bed or upon a chair. For support, a round cushion, a folded blanket, or simply the knee may be employed. With the patient lying, a support may be used or not, according to the case. With the patient sitting, either a table or knee may be used for support. The support is placed in such a way as to fix the superior part of the articulation under treatment.

In general, the joint should be considered as the junction of two levers united by a hinge which represents the articulation itself. In order to move the joint one may displace either the superior or the inferior lever, provided that one of the levers remains fixed.

In the mobilization of the shoulder the arm forms the inferior lever and the shoulder the superior lever. The chair upon which the subject is seated, especially its back, will constitute



Fig. 1. Mobilization of the Shoulder (a)

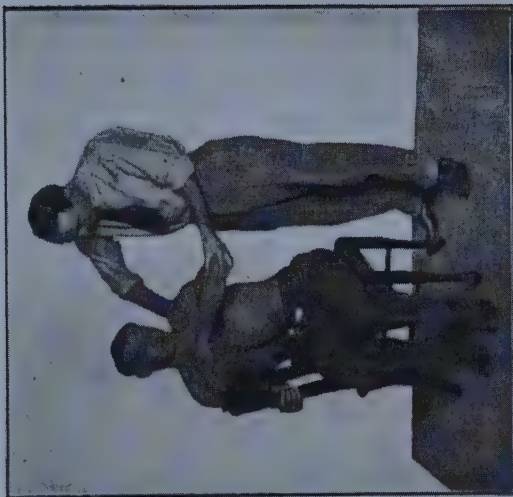


Fig. 2. Mobilization of the Shoulder (b)



Fig. 3. Mobilization of the Shoulder (c)

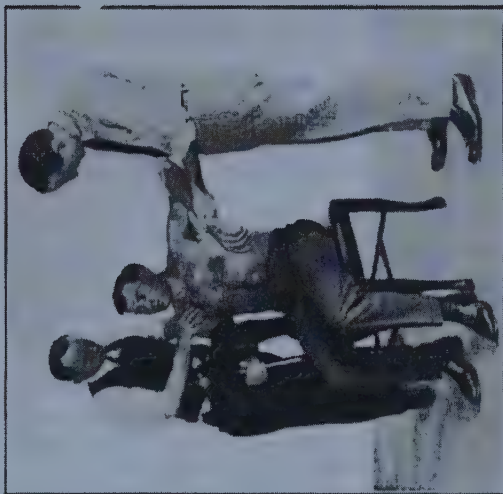


Fig. 4. Mobilization of the Shoulder (d)

the support. In the mobilization of the knee the leg will be the inferior lever and the thigh the superior lever. The knee of the operator or a cushion placed under the thigh will serve as the support. In mobilization of the elbow the arm will be placed upon a table and will form the superior lever, the forearm the inferior, and a cushion or a folded blanket placed under the arm will constitute the support.

Mobilization of the Shoulder.—The mobility of this articulation permits movements of flexion, extension, abduction, adduction, circumduction, and rotation. Thus the shoulder joint alone is capable of undergoing all the cardinal movements of mobilization. In mobilization of the shoulder six movements are employed.

Anteroposterior Movements.—In applying the treatment, the patient is seated sidewise upon a solid chair with the well arm passed over the back of the chair, as shown in Fig. 1. The patient should grasp the side of the chair firmly so as to hold himself solidly in position. The operator, standing behind the patient, places his one hand upon the patient's shoulder (Fig. [1]), the thumb upon the shoulder-blade and the fingers upon the clavicle. The purpose of this is to immobilize the scapula. The operator places his right hand upon the shoulder of the patient in the treatment of the left shoulder, and his left hand in the treatment of the right shoulder. This done, he seizes with the other hand the elbow of the affected arm and makes movements back and forth and laterally, gradually increasing the latitude of the movements. Before beginning the movements, the patient is asked to raise his elbow as high as possible. At this point, movements may be made, first backward then forward (Fig. [2]). The movement, slowly executed, is repeated four or five times, each time increasing the amplitude of the movement. The extreme points reached will be noted as a guide to subsequent treatment.

Lateral Movements.—Next, lateral movements will be executed, lowering the arm as close to the trunk as possible and then carrying it in the opposite direction as far as possible (Fig. [3]). Some pain will be produced, but care should be

taken to avoid giving too great pain. Note the extreme limits reached.

Circumduction.—The elbow should now be made to describe a circle, the circumference of which falls just within the extreme points reached in the preceding movements. Three or four circles are described in a forward direction and the same number backward, an effort being made to enlarge the circle each time slightly, but avoiding giving extreme pain.

Rotation with Flexed Arm.—An assistant is required for this movement. Standing behind the chair, the assistant places one hand in front of the sound shoulder and the other at the back so as to hold the patient firmly in position. The operator then grasps the patient's elbow with one hand and his wrist with the other. The elbow is raised as high as possible and the forearm flexed to a right angle; then, using the forearm as a lever, the arm is rotated in its socket, moving the forearm up and down so as to describe arcs of a circle (Figs. [4 and 5]). An effort should be made to slightly increase the latitude of movement with each rotation. By this movement adhesions which fix the head of the humerus may be broken up.

Rotation with Extended Arm.—This movement may be applied without the aid of an assistant. With the patient sitting in such a position that the sound shoulder is against the back of the chair and the other arm extended (Fig. [6]), the operator places one hand upon the patient's shoulder and with the other hand grasps the wrist of the patient's extended arm. By moving the wrist in various directions the head of the humerus can be made to rotate in its socket. The movements must be very moderate at first, especially when adhesions exist or grating sounds are noted, indicating roughening of the joint surfaces. Special care must be taken to avoid producing excessive pain; two or three days may elapse between treatments if the manipulations are followed by a considerable degree of pain and soreness. Later, when the mobility of the arm is increased, circumduction movements may be executed.

The operator, standing behind the patient, may grasp the



Fig. 5. Mobilization of the Shoulder (e)



Fig. 6. Mobilization of the Shoulder (f)



Fig. 7. Mobilization of the Elbow (a)



Fig. 8. Mobilization of the Elbow (b)

wrist of the extended arm and bring it behind the head or carry it behind the back without flexing the elbow.

Mobilization of the Elbow.—The elbow has only two movements, flexion and extension. In mobilizing this joint two procedures may be employed. In one, the table is used for support (Fig. [7]); in the other, the knee (Fig. [8]). In the first method the patient sits near a table, placing his arm upon a cushion or a folded blanket, as shown in Fig. [7]. The patient's side should be close to the table and his elbow at the corner of the table. The patient inclines his head toward the affected shoulder, thus helping to hold the shoulder in position. The operator places one hand upon the arm just above the elbow and with the other grasps the wrist. He endeavors first to flex the arm and then to extend it. The movements are made very slowly, their amplitude being gradually increased. The movements of flexion and extension should be made first with the palm of the hand facing the shoulder and then with the arm partially rotated.

When the knee is used for support the operator sits at the side of the patient with his knee raised, his foot supported, and the patient's arm resting upon his knee (Fig. [8]). The operator grasps the patient's upper arm with one hand and the wrist with the other, and then executes flexion and extension movements with and without semipronation, as before.

In making extension movements of the elbow it is often necessary to proceed gradually on account of the contraction of the flexor muscles; that is, after extending the arm as far as possible without too great pain the arm is held in position for a few minutes, then extended a little farther, and after another rest still farther. When the restriction of movement is largely due to contraction of the muscle this method of fractional extension succeeds by overcoming the resistance of the muscle, which becomes fatigued and yields to the continuous strain.

Pronation and Supination of the Forearm.—Two procedures may be employed. In the first, the forearm rests upon a cushion placed upon a table or upon the bed if the patient

is not able to sit up (Fig. [9]). In the second, the forearm is held in the vertical position, the elbow resting upon a cushion or upon the operator's knee. When the first procedure is followed, the forearm resting upon a cushion, the operator places one hand upon the elbow and with the other hand grasps the patient's wrist so that the thumb is placed against one of the bones of the forearm, while the fingers grasp the other bone in such a way that by pressure of the thumb and fingers the bones may be made to move one upon the other.

In the second procedure, with the forearm held vertically, the elbow resting upon a cushion, the elbow is held firmly with one hand resting upon the arm as shown in Fig. [9], while the other grasps the wrist in such a way that the thumb rests against the distal end of the ulna and the four fingers grasp the radius. By pressure with the thumb and fingers the radius and the ulna may be made to rotate one upon the other. The movements of the head of the radius may be felt by the fingers which support the elbow.

Mobilization of the Wrist.—The wrist is capable of executing five movements, flexion, extension, abduction, adduction, and circumduction. Ankylosis of the wrist is usually due to neglect. If proper manipulations are begun at the right time ankylosis will almost never occur.

For mobilization of the wrist two methods are possible. The first consists of two procedures, a horizontal and a vertical. In the horizontal procedure the forearm of the patient is placed upon a cushion which may rest upon either the bed or a table. If the patient is able to sit in a chair the forearm rests upon the table in such a way that the hand projects beyond the end of the table (Fig. [10]). The operator places himself opposite the hand to be treated (Fig. [10]) and with one hand grasps the fingers of the patient's hand while the other hand is placed upon the forearm just above the wrist. Using the hand for a lever, up and down movements are made (flexion and extension)

If the vertical position is employed, the patient's elbow rests upon a cushion (Fig. [11]). One hand of the operator grasps the forearm while the other seizes the palm of the hand and by

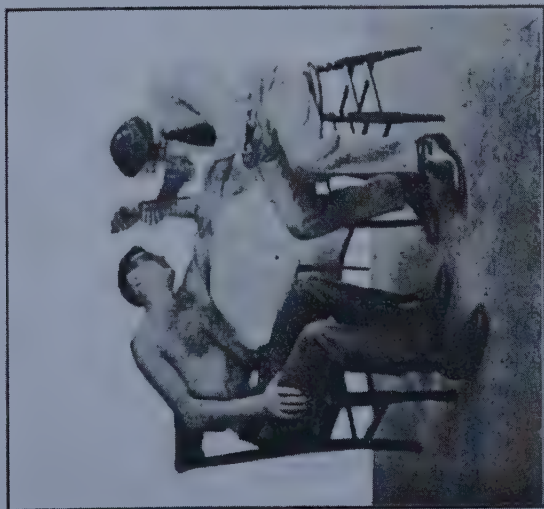


Fig. 9. Mobilization of the Elbow (c)

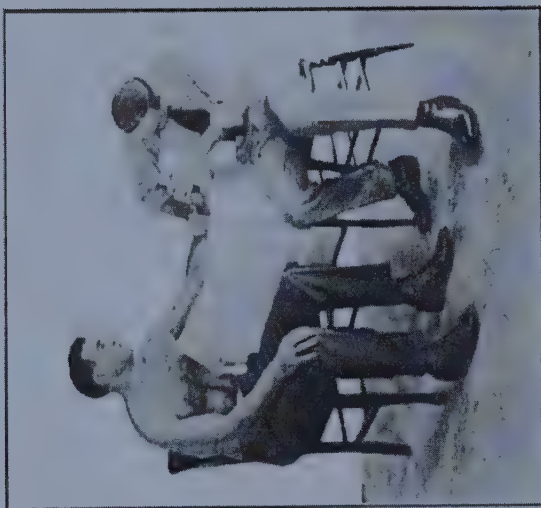


Fig. 10. Mobilization of the Wrist (a)

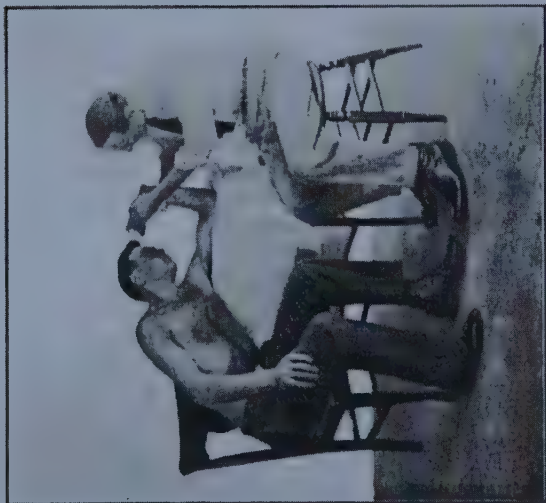


Fig. 11. Mobilization of the Wrist (b)



Fig. 12. Mobilization of the Wrist (c)

firm, steady pressure makes movements forward, backward (flexion, extension), and laterally (abduction and adduction). Finally a circumduction movement is executed, first in one direction, then the other. Simple movements may be made with the patient's forearm resting upon the operator's knee, as shown in Fig. [12].

Mobilization of the Fingers.—The movements of the fingers consist of flexion, extension, adduction, abduction, and circumduction. The movements may be applied with the hand resting upon a cushion on the table or upon the operator's knee. The patient's hand is held firmly with one hand, while with the other one finger at a time is seized between the operator's thumb and finger and moved in different directions (Fig. [13]).

Attention must be given to each joint of each finger, gradually increasing the extent of the movement until all the movements of each finger can be executed. To secure complete results many weeks or even months are often required.

In the treatment of the wrist and finger joints it is highly advantageous to apply a hot fomentation or to place the parts in hot water for ten or fifteen minutes prior to the manipulations. The hot application renders the tissues more supple and also lessens sensibility. Hot applications made after the manipulations are also of very great service in lessening the pain and subsequent reaction. The application of a water poultice or moist pack for several hours following the manipulations is also extremely advantageous. Great care should be taken, however, to see that the parts are so warmly wrapped that they cannot become chilled.

Hydriatic Applications.—It is highly advantageous to combine hydriatic applications with manipulations having for their purpose the mobilization of joints. Immersing the parts in hot water or applying a hot fomentation for ten or fifteen minutes prior to the manipulations renders great assistance by increasing the suppleness of the parts, especially through the relaxation of contracted muscles and by making the manipulations less painful. Hot applications may also be applied after the manipulations with great advantage. In cases in which there is a

pronounced tendency to reaction following the manipulations, the water poultice or hot compress should be used in addition to the fomentation or the hot bath. The heating compress consists of a towel or several thicknesses of cheese cloth wrung quite dry out of cold water, applied to the affected parts, and properly covered with a mackintosh and flannel in order to exclude the air and prevent evaporation. The mackintosh should be applied directly over the wet cloth and should be a little larger so as to extend beyond the compress on all sides. The flannel bandage should be still larger and should be thick enough to make sure that the parts will be kept thoroughly warm, as chilling is likely to do much harm.

Mobilization of the Hip.—The patient should lie on his back and the pelvis should be fixed by the aid of an assistant, as shown in Fig. [14]. The assistant places his hand upon the pelvic bones of each side and presses firmly while the operator grasps the heel of the affected leg with one hand and places the other hand upon the thigh just above the knee. The leg is raised and carried first outward, then inward, then moved up and down. The movements are executed slowly, care being taken to avoid much pain. When some latitude of movement is secured the movements of circumduction are made, describing a circle with the foot. Rotation of the bone in the socket is accomplished with the leg extended by grasping the foot and turning the leg first in one direction, then in the other.

When the thigh can be flexed, as shown in Fig. [15], more extended movements may be executed. With one hand upon the knee (Fig. [15]), the other hand grasps the foot and the leg is then made to execute the various movements of flexion, extension, abduction, adduction, and circumduction. Rotation is accomplished by using the lower leg as a lever and describing arcs of a circle of which the knee is the center.

It should be remembered that ankylosis of the hip joint when complete should be let alone. No attempt should be made at mobilization by manipulations, which are in such cases not only unavailing but often do much harm. In cases in which no disease is present in the joint and in which the ankylosis is



Fig. 13. Mobilization of the Fingers



Fig. 14. Mobilization of the Hip (a)



Fig. 15. Mobilization of the Hip (b)



Fig. 16. Mobilization of the Knee (a)

incomplete, the mobility of the joint may be increased, if not in every case completely restored, by manipulations properly employed. Experience has shown that when adhesions are present it is better to overcome them by degrees through manipulations than to undertake to break them up by force applied under anesthesia, since violent measures of this sort are likely to provoke so strong a reaction as to give rise to troublesome subacute or even acute inflammation.

Mobilization of the Knee.—The knee is a hinge joint. Its chief movements are flexion and extension, although, especially when the limb is half flexed, slight lateral movements and even very slight movements of rotation are possible. When the leg is fully extended, lateral and rotation movements are not possible in the normal condition and when present indicate relaxation of the lateral ligaments.

Two methods may be employed: first, with the patient lying upon the back; and second, with the patient sitting, the knee of the operator being used as a support.

First method: With the patient lying upon the back a firm cushion is placed underneath the thigh close to the knee (Fig. [16]). The operator places one hand upon the thigh above the cushion and with the other grasps the ankle. The leg is first forced down as far as possible without producing too much pain, then raised or extended as far as possible, care being taken to hold the thigh firmly in position so as to make sure that the flexion and extension are real and not simply apparent. The movements are at first slight, then gradually increased in latitude. The thickness of the cushion must be increased to permit the required amplitude of movement. The number of flexions and extensions at each treatment will depend upon the degree of reaction. The usual number will be five to ten, or even more when reaction is slight. In cases in which there is no trace of arthritis and when the movements give no pain, rapid progress may be made. In cases in which the joint is sensitive and painful, the movements must be very gentle at first and progress very gradual. Hot applications before and after each treatment and the application of the heating compress

in the interval between treatments are measures of great value. When an interval of two or three days is permitted to elapse between treatments, fomentations may be applied two or three times a day and the heating compress should be applied in the interval. Care should be taken to secure mobility of the knee-cap. This is accomplished by grasping the knee-cap between the thumbs and fingers and endeavoring to move it first from side to side, then from above down. The patient must be instructed to relax the muscles of the thigh during the manipulations. All manipulations should be avoided when heat or any other evidence of inflammation is present.

Second method: The patient sits upon a chair or on the side of his bed. The operator takes his position opposite the knee to be treated and places the patient's limb over his knee, as shown in Fig. [17]. One hand of the operator is then placed with firm pressure upon the patient's thigh just above the knee, so as to hold it firmly in place while the other hand grasps the ankle and makes flexion and extension movements. This method is, on the whole, the best for mobilization of the knee.

Mobilization of the Ankle.—The ankle has numerous articulating surfaces and many different movements. Its principal movements are flexion, extension, adduction, abduction and circumduction. A slight degree of rotation is also possible. Two methods are employed.

First method: With the patient in the lying position, the leg is supported by a firm cushion placed just back of the heel (Fig. [18]). The operator, standing opposite the outside of the limb, places one hand upon the limb above the cushion to hold it firmly in position, and with the other hand grasps the foot by the plantar surface and executes, first, movements of flexion and extension; then adduction and abduction, making the amplitude of the movements as great as possible without severe pain. At frequent intervals circumduction movements are made.

Second method: With the patient sitting and the limb resting upon the knee of the operator, as shown in Fig. [19], flexion and extension, adduction, abduction, and circumduction move-

Fig. 17. Mobilization of the Knee (b)



Fig. 18. Mobilization of the Ankle (a)



Fig. 19. Mobilization of the Ankle (b)



Fig. 20. Mobilization of the Toes

ments are made, always keeping within the patient's tolerance. This method is, on the whole, more convenient and efficient than that in which the patient is in bed.

Mobilization of the Joints of the Toes.—The mobility of toe joints is among civilized people very limited, although the Japanese use their toes with much facility, as do also the wild tribes of the Philippine Islands. Mobilization of the toes concerns especially the great toe. The procedure consists in executing the movements of flexion, extension, abduction, adduction, and circumduction for each toe. The best position for the patient during the treatment is sitting with the foot resting upon the knee of the operator, as shown in Fig. [20]. The dorsal position may be employed if necessary. In addition to manipulations of the toes themselves, digital massage should be applied to the entire foot, special attention being given to the sole of the foot; the fascia and deep tendons of the sole should be stretched. This is necessary in order to mobilize these deep structures, which are often shortened and more or less consolidated by adhesions.

Contraindications for Mobilization of the Joints.—Those who condemn mobilization, even in chronic cases, claim that no force is capable of opposing the processes which give rise to ankylosis when they have once begun. Lucas-Championnière, and other eminent French surgeons have clearly demonstrated the excellent results to be obtained by early mobilization.

It is to be understood, of course, that in the presence of a suppurative arthritis of any sort movement of the joint is contraindicated so long as the suppuration exists. Bony ankylosis of the joint is necessarily a contraindication. To break down a bony ankylosis by force only does harm. Mobilization is also contraindicated in tuberculosis of joints and in joints adjacent to fractures which have not yet become fully consolidated. On the other hand, methodical mobilization of joints is clearly indicated in all cases of injury of the limbs in which it is important to combat the degeneration of nerves, muscles, articular surfaces, and circulatory structures which is the natural result of disuse. The only question open to discussion is that of the time at

which the joint movement should begin. Numerous surgeons fear that joint movements begun too soon tend to prevent the consolidation of fractured bones and the cicatrization of wounds of the soft parts. No one claims that joint movements should be begun before a fracture is consolidated, and certain joint movements should not be applied when likely to disturb a suppurating wound; but even in such cases no harm would be done through the mobilization of joints far removed from the seat of injury. The great value of manipulations of such joints can no longer be denied as there are thousands of persons suffering from ankylosis of articulations quite distant from an injured part, the result of long-continued inactivity. For example, it is not rare to encounter ankylosis of the shoulder in a man who has had a fracture of the lower extremity of the radius, and ankylosis of the wrist in a patient who has had a wound of the shoulder. In every case of injury to the extremities, mobilization of distant joints not involved in the injury or next to it should be begun at the very outset of treatment.

Mobilization of joints is equally indicated in cases of sprains, after reduction of dislocated joints, rheumatic joints in which inflammation is not active, and in certain cases of neuritis.

In some chronic cases, especially when it is necessary to break up adhesions of joints, it is important to employ heat by means of fomentations, the hot air douche, the photophore, or by some other method. Finally, it should be remarked that examination of the joint and the neighboring parts with the X-ray is a most valuable way of determining whether or not mobilization is indicated. Such an examination should always be made when there is any doubt.

Special Movements and Breathing Exercises to Be Used in Con- nection with Massage

All patients to whom massage is given should be carefully instructed in regard to proper breathing and should be made to execute special breathing exercises.

In addition it is very necessary in the case of feeble invalids to give to the patient carefully graduated exercises which will exercise all the muscles of the body and especially the muscles of the trunk, which are universally weak in this class of persons. All weakly sedentary persons may be benefited by such exercises and movements. The inactivity which is the necessary result of feebleness or a sedentary life gives rise to numerous evils, which profoundly affect the health and ultimately produce grave organic changes.

Evils Resulting from Limited Breathing Movements. The chest is a double pump. It pumps air into and out of the chest, and at the same time acts as a suction pump drawing blood toward the heart. When the chest wall is raised in inspiration, a partial vacuum is created in the chest which acts upon the large blood vessels and their contents as well as upon the air passages of the lungs. The heart and the large vessels of the chest which communicate with it are dilated, and the blood rushes in from every direction—from the head, the arms, and other parts of the body, but especially from the liver, the stomach and the organs of the abdomen which are below the diaphragm. The diaphragm is lowered in expiration and thereby compresses the liver and the other abdominal organs so that the blood-vessels of the abdomen are affected in a double way—first, by suction upon the chest, and second, by the compression between the diaphragm and the abdominal wall; hence respiration is of the highest importance as a means of aiding the circulation through the abdominal organs, the so-called portal or splanchnic circulation.

The ordinary breathing movements are necessary as a means

of aiding the portal circulation. Constantly when asleep as well as when awake the suction and compression of the abdominal viscera is going on. During active exercise the action is very greatly increased. During vigorous muscular exercises, the chest movements are very greatly increased in vigor. The suction and compression force referred to are increased to five or even ten times the ordinary amount. In deep inspiration the liver is emptied of its stagnant blood just as one can empty a wet sponge of the water it contains by a tight squeeze.

The liver performs many very remarkable functions, all of which depend upon the activity of the circulation of the blood through it. For example, it purifies the blood by removing from it the elements of the bile. The amount of activity of the liver will, of course, depend upon the amount of blood circulating through it. It takes out of the portal blood the sugar which has been formed in the digestive process and stores it up in its tissues in the form of glycogen. It then reconverts the glycogen into sugar and doles it out to the blood in small doses to meet the requirements of the body moment by moment.

These important functions also depend directly upon the rate at which the blood moves through the liver. The gall-bladder connected with the liver is a receptacle for bile. The respiratory movements serve to compress the gall-bladder intermittently and so prevent the stagnation of the bile. When bile stagnation occurs the germs which are constantly present in multitudes in the small intestine ascend the bile ducts, establish themselves in the gall-bladder, and give rise to gallstones which are now known to be the result of infection with intestinal germs. With each descent of the diaphragm in vigorous respiration, the gall-bladder is compressed as one might squeeze the bulb of a syringe, and the bile is ejected through the small ducts into the intestine, thus sweeping away any bacteria which may have begun working their way up the gall-duct toward the liver and the gall-bladder.

The common resort to liver tonics and stimulants for the latent symptoms is in the highest degree irrational. Exercise is a sovereign remedy which will afford relief quicker than any drug which can possibly be administered.

The stomach also depends upon the activity of the chest and diaphragm for the efficient performance of its functions. After a meal, the up-and-down movements of the diaphragm serve to knead the stomach. The rhythmic compression of the stomach in breathing, repeated eighteen to twenty-four times a minute, is of great assistance in moving the digestive foodstuffs on through the stomach into the intestine, while the suction force exerted by the chest upon the abdominal contents aids greatly in the process of absorption of the digested foodstuffs.

Deep breathing is a great aid in gastric digestion. Patients who habitually suffer from heavy sensations in the stomach and other indications of slow digestion are greatly relieved by these deep breathing movements.

A congested organ is always hypersensitive. A few deep breathing movements serve to change completely the blood in the stomach and other organs, the presence of fresh blood filled with oxygen, restores normal conditions and relieves reflex distresses which arise from congestion and abnormal irritations such as colic, pain under the shoulder, pain under the shoulder-blade, pain at the back of the neck, headache, depression of spirits, sensation of load upon the stomach and numerous other pains and distresses.

The functions of the small intestine and the colon are also aided by the deep breathing movements. Each descent of the diaphragm compresses the intestine and aids in the movement of digesting foodstuffs along the twenty-five feet of small and large intestine.

A portion of the colon lies adjacent to the diaphragm. The whole of the transverse colon is so situated that the pressure exerted by the downward movement of the diaphragm falls directly upon it. Deep breathing movements are a great aid to proper bowel action, as they serve to accelerate the movement of the food along the transverse and descending colon.

When one sits in a relaxed position, that is with the shoulders forward and the chest flat, the distance between the lower end of the sternum and the pubes is diminished so that the great muscles which connect the lower ribs and the sternum with the pubic

bone and the rim of the pelvis are relaxed and slackened. When the chest is raised high, these muscles are put upon a stretch. It is evident then that when the chest is flat and the body bent forward, the descent of the diaphragm does not compress the liver, stomach and other organs as when the abdominal muscles are made tense by raising the chest forward and upward. Under such conditions, the functions of all the abdominal organs—liver, stomach, bowels, intestines and other organs must be very greatly interfered with in a person whose habits are sedentary, especially in desk workers who lean forward at their work thus flattening the chest and relaxing the abdominal muscles. Seamstresses, artists, engravers and all who sit leaning forward at their work must suffer constantly from congestion of the great vessels of the abdomen. A large amount of blood which is needed in the muscles, in the brain and other parts runs away into this stagnant vascular area. The splanchnic area becomes a sort of cesspool. The blood accumulating in it loses its oxygen becomes dark and impure, and exercises a most pernicious influence upon the organs which it distends. Thus the mischief is increased.

SPECIAL BREATHING EXERCISES FOR SEDENTARY PERSONS

Many writers have laid very great stress upon what is termed "abdominal breathing." This is generally understood to be breathing in which there is free movement of the abdominal walls, while the upper chest is not permitted to expand greatly. This is a very great error. Many persons have doubtless done themselves actual injury in their efforts to practice abdominal breathing by holding the upper chest inactive while swelling out the abdominal muscles. The abdominal muscles are not in use when made to bulge greatly outward, but rather when being drawn in toward the body. Tension in the abdomen is produced by the descent of the diaphragm when the breath is drawn in. This pushes the abdominal organs downward, and the abdominal wall is necessarily pushed outward. There is no advantage whatever in making the abdominal walls to bulge in this way. Most persons when they try to breathe thus abdominally find them-

selves embarrassed, and their first attempts are exceedingly awkward because this so-called abdominal breathing is quite unnatural, and the muscular actions required to execute the movement are not readily brought into play.

The most effective sort of deep breathing and that which exerts the strongest influence upon the liver, stomach and other abdominal organs, comes into play automatically when the chest is lifted high in taking a deep breath and then held in position while the breathing movement is completed. This is what the singing masters call "setting the chest."

Breathing Exercises

The following exercises are to be taken in each of the positions, lying, sitting and standing. Patients who are to take these exercises should be instructed to practice breathing lying upon the face for at least fifteen minutes, three times a day and to adopt the practice of sleeping in the prone position.

SERIES I—LYING

1. *Full Breathing.* Take slow, deep inspirations through the nose, expanding the whole trunk, complete prolonged expiration through compressed lips.

2. *Abdominal Breathing.* Chest high, hands on hips, thumbs to rear. Contract abdominal muscles with strong expiratory effort; press hard with thumbs upon the lower back to hold chest up during expiration.

3. *Assisted Abdominal Breathing.* Chest high, hands holding abdomen, deep abdominal breathing.

4. *Chest Lifting.* After complete expiration, lift chest high as possible then take a full breath.

5. *Chest Lifting, Arms Raising.* Chest high, deep abdominal breathing. Arms raising above head.

6. *Chest Lifting, Arms Circumduction.* Chest high, deep abdominal breathing. Arms circumduction.

7. *Chest Lifting, Feet Extension.* Chest high, deep abdominal breathing. Feet extension.

8. *Chest Lifting, Arms Raising, Feet Extension.* Chest high, deep abdominal breathing, arms raising and feet extension.

9. *Chest Lifting, Swimming Arms.* Chest high, deep abdominal breathing, swimming movements with arms.

10. *Chest Lifting, Swimming Arms and Legs.* Chest high, deep abdominal breathing, swimming movements arms and legs.

SERIES II—SITTING

Execute the above movements in the sitting position as above described except No. 10, in which knee raising is substituted for leg movements.

SERIES III—STANDING

Execute the above movements in the standing position as described with exception of No. 10, in which combine knee bending with swimming movements of arms.

The standing position taken in breathing exercises should be with heels and hips against a wall, the chest being held forward as far as possible without losing the balance.

The Schott Method

The system of passive and resistive exercises employed and recommended by the Doctors Schott of Nauheim, Germany, is simply an adaptation of the Ling system, the so-called manual Swedish movements, which have been used in Sweden, Norway and Denmark for more than fifty years. The writer visited Sweden in 1883 and made a study of the Ling System under the famous Professor Hartelius, at that time the head of the government institution at Stockholm for giving instruction in Swedish gymnastics. The method has been in use since that time in the Battle Creek Sanitarium.

But the scientific demonstration of the very great value of this method in the treatment of cardiac cases, and its adoption, is largely due to the efforts of the Doctors Schott, who succeeded, after years of persevering effort, in convincing the medical profession throughout the civilized world of the value of this method in treating heart disease. It is to be regretted that as yet the treatment of cardiac cases by exercise is quite exceptional. The average physician is not sufficiently familiar with the technique of the method to make a successful application of it; neither can he spare the time required for the administration of the treatment with his own hands. The world is waiting for a new generation of trained nurses who shall be thoroughly trained in the technique of all physiologic methods, including medical gymnastics.

The general principles applicable to the employment of passive movements and the essential technique will be found in the chapter on "Joint Movements" (page 94).

The passive movements which the Doctors Schott and others who have adopted their method have found especially valuable in the treatment of cardiac affections, together with the rules pertaining to the application of the movements, are given in the succeeding pages.

Each of the following movements is taken with resistance in both directions:

1. Arms forward stretch, sidewise moving, returning.
2. Arms downward stretch, forearm flexion and extension.
3. Arms downward stretch, forward upward moving returning.
4. Fingers flexed, knuckles in contact at umbilicus, arms raising to vortex, returning.
5. Arms downward stretch, forward raising to upward stretch.
6. Trunk forward bending; resistance, (a) hands sternum and loins; (b) hand at upper spine
7. Trunk rotating; resistance (a) left hand in front of patient's right shoulder, right hand behind patient's left shoulder; (b) reversed.
8. Lateral trunk flexion; resistance, attendant in front of patient, (a) right hand under patient's left arm, left hand on patient's right hip; (b) reverse.
9. Same as 1, except fist firmly clenched.
10. Same as 2, except palmar surface is turned out, and fist firmly closed during exercise.
11. Arm circumduction, one arm at a time.
12. Arms backward raising—trunk must not bend forward.
13. Knee raising, body balanced by support of opposite hand.
14. Leg forward and backward raising.
15. Leg backward flexing; hand support.
16. Leg outward raising.
17. Arms rotating extreme degree.
18. Wrist flexion and extension.
19. Foot flexion and extension.

RULES PERTAINING TO EXERCISE

1. Movements must be slow and uniform.
2. Follow each movement by an interval of rest.
3. Movements of the same limb or group of muscles should not be repeated twice in succession.
4. Movements should be immediately interrupted if any

of the following symptoms appear, and the patient must be watched closely to avoid the development of these signs, which indicate exhaustion :

- (1) Accelerated breathing.
- (2) Marked movements of the nares in breathing.
- (3) Slight drawing of the corners of the mouth.
- (4) Pallor or duskiness of the cheeks or lips.
- (5) Palpitation of the heart.
- (6) Sweating.
- (7) Yawning.

If any of the above signs should appear in the midst of the movement, the exercise must be instantly suspended, the limbs being carefully placed in a state of rest.

5. The patient should not be allowed to hold the breath. To prevent this the patient should count in a whisper from 1 to 8 while the movement is being executed, or during each half of it.

6. Constriction of the limbs or any other portion of the body whereby the blood-vessels may be compressed, must be carefully avoided.

7. The force of the movement must be very carefully graduated to the strength of the patient. It is sometimes necessary to employ only the very gentlest resistance. Patients who are bedridden, and those who are very feeble cannot at first take all the movements, but must take only such as are adapted to their condition or strength.

8. Examination of the heart should be very carefully made in every case before beginning treatment. In cases of emphysema, asthma, and in obstruction of the aortic orifice, great care must be taken, especially with the arm-raising movement to avoid producing syncope, on account of the obstruction of the pulmonary circulation. The same rule applies to any condition in which the respiratory area is diminished, as in pleuresy with effusion, consolidation of the lung, dropsy of the chest, pyothorax, or pneumothorax.

9. In these cases the movements must be executed very slowly, so as to give time for the distribution of the blood. They may

have to be taken while the patient is lying down. The right side of the heart being overloaded in these cases, the arm movement should not at first extend above the level of the shoulders, unless the patient is reclining, as the extension of the right heart would be increased by giving the blood the down grade in the arteries.

10. Special attention should be given also to the patient's regimen and diet by enforcing an aseptic dietary. Such exercise as graduated mountain climbing is too severe for patients requiring this treatment. It is only adapted to cases which have made considerable advancement toward a cure. The object of the method is not to strengthen the muscles, but to regulate the circulation.

11. The patient may, to some extent, administer the exercise himself, by executing the various movements, producing the resistance by hardening the muscle, as though working against the resistant force.

RECENT PROGRESS IN MASSAGE

Massage and Muscle Work.—Maggiora conducted the following experiments: Four times daily, twice in the morning and twice in the afternoon after a three-minute application of massage to the right and left middle fingers a weight was lifted by each of these fingers with the ergograph twice every two seconds. Before massage the total weight raised was 4,250 kilos, while after massage 8,019 kilos could be raised before further contractions were prevented by extreme fatigue.

After experiments with applications of massage for varying periods, Maggiora reached the conclusion that five-minute applications produced the best results.

He also found that there was slight difference in the work done following five minutes' friction or five minutes' percussion.

He concluded from his experiments that massage will temporarily restore the working power of a muscle after fasting.

Douglas Graham, basing his statement upon another experiment relative to the effects of massage after fatigue, claims that five minutes of massage is equal to two hours of rest. He also did another experiment as the result of which he claimed that ten minutes of massage will restore muscles to such an extent even after a night's loss of sleep that they will give a normal fatigue curve.

Influence of Massage on Metabolism.—Von Noorden (*Metabolism and Practical Medicine*, vol. 1) states that the increase in the respiratory exchange during massage is very small. He says that the increase in metabolism that is so frequently taken for granted as occurring during massage, only occurs, if it should appear at all, indirectly by rendering the muscular and nervous systems more capable of performing work than they were previously. He quotes experiments by Leber and Steuve (*Ueber den Einfluss der Muskel- und Bauchmassage auf den respirator Gaswech*, *Berliner klinische Wochenschrift*, 1896, Nr. 16), who made experiments to determine the facts relating to massage. In energetic massage of the thigh or abdomen, the oxygen and

CO₂ exchange rose only 10 to 15 per cent, and the respiratory quotient was scarcely affected. Finger movements increased the oxygen exchange more than this.

These experiments clearly demonstrate that massage is but a very partial substitute for exercise. Indeed, massage after violent exercise rests the muscles and restores the aptitude for work by aiding the elimination of fatigue poisons.

Influence of Massage on Chlorin Excretion.—Keller (Einfluss der Massage auf den Stoffwech *Schweizer Korrbbl.* 1891, 393) found that massage increased the chlorin excretion. In his experiments he gave food containing only a small percentage of sodium chlorid, and one would expect that the chlorin excretion would have been diminished. The author intimates that there is a marked "squeezing out" from the tissues of lymph rich in sodium chlorid. This observation demonstrates the value of massage in renal dropsy in which there is an accumulation of salt in the tissues.

The Relation of Massage to Diuresis.—The majority of authors have found diuresis to be increased by massage. The following are some references: Hirschberg (*Etude physiol. et thérap. du massage de l'abdomen, Bulletin général de Thérapeutique*, Sept. 1889); G. Marinel (*De l'action du massage sur la sécrétion urinaire, Centralblatt für Chirurgie*, 1891, Nr. 38); Polubinski (*Wirk. der Bauch und Lendenmassage auf die Urinsekretion*, 1889). Bum (*Einfl. der Massage auf die Harnsekret, Zeitsch. f. klin. Medicin*, 15, 248, 1889) explains the increased diuresis by stating that certain diuretic substances are expressed out of the muscles by massage. Experimenting on animals he found that during five to fifteen minutes of massage the amount of urine excreted was greater than immediately before or after.

Massage of the Kidney Region in Kidney Disease.—Calisto (*Gazz. degli Osped*, September 29, 1907) found in acute parenchymatous nephritis that the composition of the urine became worse under the influence of massage of the kidney region,

but in interstitial nephritis an improvement was apparent; while there was a decrease in the total amount of urine, there was an increase in the specific gravity and the percentage of total nitrogen and chlorides.

Massage Treatment of Urethral Stricture.—Settier (*Siglo Medico*, 1906, p. 817) directs attention to the spastic contraction which frequently accompanies stricture of the urethra. In addition to dilatation and other surgical measures he recommends the employment of massage. He uses an ointment consisting of four grams of potassium iodide and fifteen grams each of lanolin and cold cream. A piece of this ointment as large as a cherry is massaged daily into the part corresponding to the stricture. At first very gentle manipulations are used; later the vigor of the treatment may be increased until the patient finds them painful.

Massage for Nocturnal Enuresis.—Herbsmann, in giving this treatment, first moves the surface of the finger transversely across the neck of the bladder through the rectum, and then in a longitudinal direction. The movements are used at first gently, later on, more forcibly. After this has been done for two minutes, the tip of the index finger is pressed against the neck steadily for another half minute.

The foregoing treatment has been very successfully employed even in some cases of very long standing, one of the patients being eighteen and another fifteen years of age, and both had been troubled with the affection since childhood. A cure was effected in from four to six sittings. Herbsmann believes that this treatment improves the innervation of the vesical sphincters.

Massage Movements to Influence the Liver.—Walz (*Münch. med. Woch.*, May 13, 1902) analyzes the effect of deep inspiration and expiration on the liver, and asserts that both have a powerful effect in stimulating the circulation in the liver. Moebius first called attention to this means of influencing this organ, and semifacetiously entitled it "massage of the liver." Forced expiration has a marked effect on the emptying of the gall bladder. De Frumerie has recently published a systematic

study of actual massage on the liver. He states that direct massage stimulates the extrahepatic circulation, and reduces the congestion in the portal veins. It also stimulates the functions of the liver cells in acute and chronic insufficiency of the organ. He witnessed the disappearance of sugar from the urine in certain cases of diabetes; also improvement in gout, and in passive congestion of the organ in cardiac affections and in malaria, and in certain cases of catarrhal icterus and gall-stones after the acute attacks were past. Direct massage is contraindicated, he states, in cases of carcinoma, fatty cirrhosis, amyloid degeneration, echinococcus, or abscesses in the liver. He observed hemorrhage and cardiac collapse after too abrupt application of the massage. The respiration massage of Moebius is, on the other hand, entirely harmless.

Massage of the Stomach.—In flatulent dyspepsia Statham (*The Lancet*, Feb. 24, 1906) commends massage of the stomach. He records the case of a man in whom the attacks of flatulency came on without apparent cause, often lasting for several hours, and produced severe prostration. All drugs were unavailing. Finally vigorous kneading movements of the stomach were made, and sounds could be elicited suggesting the passage of gas from the stomach into the duodenum. Later the gas was passed per anum. The explanation of the relief afforded is that the stomach was paralyzed by its extreme distention, which was relieved by the kneading movements.

Massage in Seasickness.—Wideman (*Marseilles Medical*, 1906) has had experience in the treatment of seasickness in several hundred persons by means of abdominal massage. He reports that abdominal massage is almost a panacea in this condition. In general he found that the persons who suffered from seasickness were those who had previously had more or less gastro-intestinal disturbance, and that the careful regulation of the dietary together with abdominal massage are sufficient to control the disorder, even in grave form.

The application of an ice bag to the back of the neck and a cold compress or ice bag to the abdomen in the intervals between

the applications of massage ought to enhance the good effects of the application. The patient should remain horizontal and should keep the eyes closed. Fats and meats should be avoided.

Massage for Sciatica.—Judica (*Gazz. degli Osped.*, July 23, 1901) recommends the abandonment of ointments, pills, palliatives, and empirical remedies of all sorts, and says that the treatment should be greatly restricted.

The method of Dr. Negro, which Judica strongly recommends, is as follows:

The patient should lie face downward, with the gluteal muscles entirely relaxed. The thumb is then placed over the point of exit of the nerve from the pelvis, and the strongest possible pressure applied with the aid of the other thumb superposed; this is maintained for fifteen to twenty seconds, the thumb being slightly moved in all directions laterally, but not raised; after an interval of a few minutes this is repeated. By half a dozen sittings on alternate days a cure is effected even in old-standing cases.

Massage should be used in all cases where there is no anatomical condition demanding surgical treatment, and should be used with patience and careful technique.

It may be advantageously supplemented by electricity or by hydrotherapy.

Massage for Sciatica.—Sommer (*Zeit. für Diät. und Physik. Therap.*, December, 1905) gives a method of treatment of sciatica inaugurated by Brieger, and carried out at the Hydrotherapeutic Institute of the Berlin University. The treatment consists of baths in which the movements are carried out, and of a subsequent massage. It is especially successful in cases of primary idiopathic sciatica, etc.

Heating compresses to the leg are employed, the compress being applied cold and covered with flannel, and left on for the night. In other cases the compress must be applied hot and left on for the night. In patients who cannot bear water compresses, alcohol compresses are used. In some cases dry heat only is used. If these measures are not successful, the warm full baths are

employed (37° - 40° C.: 98.6° - 104° F.); duration, ten to forty-five minutes. Toward the end of the bath the temperature is reduced to 25° C.

During the bath, movements are carried out, first passive, then active, and then against resistance. The limit to which the movements can be carried depends on the amount of pain to which they give rise. If during the course of the bath pain should become excessive, vibration massage, carefully applied with the forefinger over the sensitive area, often acts like a narcotic and gives speedy relief.

Massage, except the vibration massage, is not begun until the most prominent subjective symptoms have begun to yield to treatment. It is carried out directly after the bath, or, if it is necessary in order to lessen pain, while the patient is in the bath. At first light stroking or pressing is used, and later the typical Metzger's massage. Special emphasis is laid on Laseque's method of stretching the sciatic nerve. To do this the doctor lays one hand on the patella, and with the other grasps the patient's heel and raises the leg; as soon as the patient feels severe pain the leg is brought down to the horizontal again. This exercise can be performed at first once a day, and later two or three times or even oftener. Later on in the treatment gymnastic exercises are employed, designed to produce a slight passive extension of the nerve.

The Massage Treatment of Headache.—Worbs (*Deutsche med. Woch.*, March 19, 1907) believes in the principle of Cornelius that nervous pains can be cured by massage of certain nerve points, moderate pressure of which produces the sensation of pain. He explains the sensation of pain as being due to compression of the nerves at these points by overgrowth of active tissues with a production of minute adhesions. Systematic massage breaks up these adhesions and thus relieves pressure on the nerve.

The "nerve points" in cases of headache are usually as follows:

- a. From the margin of the trapezius.

- b. The sterno-hyo-mastoid muscle at its origin, its insertion, and along its course.
- c. The temporal muscle.
- d. The orbital muscles.
- e. The occipital frontal muscles.

Sometimes the finger of the masseur detects at these points an area of induration, or general rigidity. The massage is applied over the painful points with one finger with perpendicular rotary movements. Such movements in healthy persons are felt as a boring finger; in persons suffering with recurrent headache of the neurasthenic or neuralgic type such massage causes marked pain. A careful course of massage over these painful points usually produces a permanent cure.

There are disadvantages to this treatment, particularly the severe pain which it oftentimes induces. The method is very tedious, weeks being required, in many cases, to complete the treatment. The massage is given daily for fifteen to twenty minutes. Other favorable reports of four cases are given.

Massage in Atrophic Rhinitis.—Weightman (*Post-Graduate*, August, 1907) treats atrophic rhinitis by massage of the inferior turbinates. Treatment should be applied twice a week by gently stroking the inferior turbinates with an applicator carrying a pledget of cotton soaked in Dobell's solution. Patients are also instructed to keep their nostrils clear of crusts by the free use, at least three times a day, of dilute Dobell's solution.

Massage in Trachoma.—Weiner (*Journal of Ophthalmology and Oto-Laryngology*, vol. 1, No. 3) recommends that in trachoma massage should always be from the fold of the lid toward the edge, and never back and forth, or from side to side. After a few moments' rubbing, a sticky mucous secretion appears, and the follicles can be seen to empty rapidly.

Colon Massage.—A considerable advance has recently been made in massage of the colon, a brief description of which will be found of very great practical use. The recent studies of Combe, Metchnikoff, and others in relation to intestinal auto-intoxication have shown the enormous rôle played in the etiol-

ogy of chronic disease by putrefactive processes in the colon. Unquestionably, the retention of undigested foodstuffs in the colon, and the putrefaction of protein substances in this intestinal reservoir is the fundamental cause of a large share of the chronic ills from which human beings suffer.

Intestinal autointoxication is perhaps the most common of all chronic maladies. To these colon putrefactions may be traced a large proportion of all cases of Bright's disease and other degenerative disorders; arteriosclerosis and many general and local disorders which grow out of degeneration of the blood vessels; most skin diseases; emaciation, headaches, neurasthenia and a multitude of other ills. Most sedentary persons, especially women, are suffering from the too long retention of fecal matters in the colon, especially in the cecum. This capacious portion of the colon often becomes a veritable cesspool in which most virulent poisons are being constantly produced and absorbed into the blood. Chronic constipation is a veritable "mother of maladies."

In the treatment of all forms of chronic diseases great attention must be given to the colon, and massage is one of the most effective means of mechanically aiding the crippled large intestine. The aim should be to accomplish a thorough emptying of the colon daily. Two or three movements daily are better than one. Careful regulation of the diet is, of course, essential for the accomplishment of this, but massage may render efficient service. The ordinary methods, however, are exceedingly inefficient, and in the majority of cases accomplish very little. The method described below is the result of the author's observations and experience during many years, and has been employed with most excellent results in the treatment of hundreds of cases in the Battle Creek Sanitarium:

Technique of Colon Massage

The fundamental idea in this method is to combine mechanical external applications with gravity in the emptying of the cecum and the movement of the intestinal contents along the anal.

Position of Patient

The patient lies upon the back with the hips elevated to an angle of nearly forty-five degrees. Several pillows may be used for this purpose, or the ordinary bed rest. The latter is better, as the patient can be placed in position on the bed rest before the rest is raised to position. The feet should be supported with the knees flexed so as to relax as completely as possible the abdominal muscles. The several steps are as follows:

1. Deep breathing movements. The patient is instructed to breathe deeply as possible with the chest held high and "set," that is, after a deep breath in which the chest is raised as high as possible, the chest is held in position during the expiration. Breathing is conducted almost entirely with the diaphragm. As the diaphragm descends the abdominal wall is pushed out, while the chest wall remains practically immovable. Raising the chest serves to render tense the abdominal muscles by increasing the distance between the pubic bone and the sternum and ribs. The consequence is that two forces are brought to bear which tend to drain the blood-vessels of the abdomen: First, gravity; and second, the compression of the abdominal contents between the diaphragm and the stretched abdominal muscles. This draining of the intestinal vessels improves the tone of both the muscular and nervous tissues of the intestine, and so tends to promote intestinal activity. The increased tension of the abdominal walls, by compressing the intestines, also favors the onward movement of their contents. Six or eight deep breaths should be taken before beginning the manipulations.

2. Lifting the abdominal contents. In quite a large proportion of cases of constipation, the difficulty is in part due to prolapse of the transverse colon. The consequence of this prolapse is a flooding and constriction of the bowel at both the hepatic and the splenic flexures. The effect of this is to hold back the intestinal contents in the cecum and also to give rise to the accumulation of fecal matters in the prolapsed transverse colon. It should be remembered that a dilated colon is always elongated as well as increased in diameter. The colon is like a

rubber sac,—when over-stretched it increases in all its dimensions.

It is important, then, that in the beginning the manipulations of the abdominal contents, the intestines should, so far as possible, be placed in their normal positions. The elevated position of the hips facilitates this, as it brings gravity into play to assist in raising the prolapsed organs. The deep breathing described in the first procedure also renders great service. Moving the abdominal contents up and down by the alternate contractions and relaxations of the diaphragm in conjunction with the tense abdominal muscles serves to mobilize the intestinal viscera, thus facilitating the action of gravity in dragging them toward the upper part of the abdominal region.

3. The hands should also be employed with great effectiveness. For this purpose, the ulnar edge of the hands—the little finger side—should be placed just above the pubic bone and Poupart's ligaments, the tips of the fingers of the two hands touching. While the hands are held firmly in position, the patient is instructed to take a very deep breath. Then while the patient breathes out, the hands are moved upward toward the umbilicus with firm pressure toward the spine. In this movement, slowly executed, the hands should be moved from the pubes to the umbilicus during the first breath. During the succeeding breath, the space from the umbilicus to the ribs is covered. The hands are then returned to the lower part of the abdominal cavity, and the same movements are again executed. The movements should be repeated eight or ten times.

4. Kneading of the colon with breathing. With the closed hand deep kneading movements are executed along the whole course of the colon, beginning with the Poupart's ligament on the right side over the cecum. Repeat three or four times.

5. Circular palm kneading. This movement is executed with the ulnar side of the hands in such a way as to cover the whole course of the colon. It should be repeated six or eight times.

6. Digital compression of the colon. With the fingers held rigid, the tips of the fingers of the right hand are passed slowly

along the whole course of the colon, firm pressure being made at intervals of two or three inches. In case of fat subjects, both hands may be employed, one pressing upon the other. The purpose is to stimulate contraction of the colon by pressing it firmly between the finger and the posterior wall of the abdominal cavity.

The duration should be fifteen to twenty minutes. During the whole seance the patient should be made to practice deep breathing movements, holding the chest high. The patient should also be instructed to practice automassage ten or fifteen minutes night and morning with the hips elevated. With the hips elevated the patient makes firm pressure with the hands one placed above the other along the course of the colon, beginning with the cecum.

Massage for Constipation.—Tobias in describing his technic for the application of hydrotherapy, massage, or other exercises in the treatment of constipation, warns that in cases of atony the treatment should be suspended frequently. In the spastic form all stimulating measures should be avoided.

Sicard and Infroit (*La Presse Méd.*, 1907, No. 99) showed that food occupies seven hours in passing from the stomach to the cecum, fourteen hours in the cecum and ascending colon, and three hours from the transverse and descending colon—twenty-four hours in all.

There is no evidence that stasis occurs in the small intestine. Delay most likely occurs in the stomach and cecum. Atonic conditions which produce loss of tone in the gastric walls induce a similar condition in the cecum.

Mangelsdorf calls attention to this parallelism which exists between the muscles of the stomach and the muscles of the intestines. When one is atonic the other is likewise atonic.

Massage of the Rectum for Hemorrhoids.—A. Cuche (*Tablettes Médicales Mobiles*, July 1, 1903) highly recommends rectal massage for hemorrhoids. The finger should be inserted daily into the rectum about an inch above the sphincter, and the

muscle worked upon for about half a minute. The cure may be much facilitated by general abdominal massage.

Massage of the Breasts during Lactation.—Bacon (*Journal Amer. Med. Assn.*, Aug 16, 1902) in discussing the treatment of painful congestion of the breasts at the beginning of lactation, condemns rubbing from the circumference toward the nipple, the evident purpose of such effort being the removal of milk from the breasts. Painful breasts at the beginning of lactation usually contain little milk. The pain is due to temporary overfilling of the lymph- and blood-vessels. The effort should be to cause an emptying of the vessels.

The rubbing begins in the axilla and under the clavicle, using but little pressure at first, and gradually increasing it. The gland itself may or may not be massaged, but the manipulations should not cause pain and should consist of gentle but firm friction movements in the direction of the blood current in the veins leading from the breast. Massage should be reserved for cases of non-infected breasts in which relief cannot be obtained by supporting bandages.

Massage in Joint Affections.—Nordstrum (*New York Medical Journal*, 1904) reports very satisfactory results in the treatment of joint affections by massage.

Metzger, of Amsterdam, even applied massage to joints attacked by acute inflammation, followed by passive movements.

Massage has a powerful antiphlogistic effect, causing the venous stagnation to disappear, and promoting absorption. Hence massage is indicated in all cases of acute inflammatory joint disease, except when suppuration is present, and except during the period of acute effusion. In Nordstrum's hands this method has yielded rapid and positive results.

Massage in Hemiplegia.—When paralysis of central origin comes on suddenly, Graham (*Boston Medical and Surgical Journal*, Dec. 12, 1901) abstains from massage until the general perturbation has subsided, and the patient has become used to his condition, remembering, however, that peripheral pathologic

changes are meanwhile gaining ground through vasomotor and trophic changes. These latter are rational indications for massage either as a preventive or palliative.

When recovery followed manipulation, it was formerly thought that the central disturbance had entirely passed away; but it is possible that other parts of the brain have been educated to take the place of the injured ones.

Massage and movements restore to muscles a sense of existence, and afford the only means of judging of the capabilities of the patient, who ought to have the benefit of any doubt in long continuance of the treatment.

It would be remarkable if one part of so important an organ as the brain should not be capable of supplementing the work of another or doing the work of both.

Local Massage in the Treatment of Bedsores.—Teller (*Münch. med. Woch.*, May 12, 1908) successfully prevents and cures bedsores by the application of local massage. The manipulations have the effect of inducing hyperemia in the edges of the sores. The application of the massage takes time and patience. The wound is cleansed with gauze sponges and some antiseptic. The space around the sores is then covered with Lassar's paste (or yellow vaseline). The edges of the wound are then massaged with the forefinger, light pressure being employed, for from two to ten minutes. The parts are then covered with paste, and the floor of the sore is covered with a small wet compress or dusted lightly with some antiseptic powder, the whole region being then covered with a smooth layer of gauze, then a thin layer of cotton, and then with oiled silk, the whole being held in place with strips of adhesive plaster. This treatment should be employed once a day. Warm full baths, the patient lying on a sheet stretched over the tub, promote the tendency to healing.

Syphilitic Infection Through Massage.—Robert W. Taylor reported at the International Dermatological Congress, September 9-14, 1907, a case of syphilis in which the infection was doubtless caused by the manipulation of the masseur, whose hands had been soiled with the secretions of mucous patches.

Rhythmic Pressure-Massage.—Schmidt (*Munch. med. Woch.*, 1907, vol. 54, No. 24) has employed a method of massage in which pressure takes the place of the usual rubbing movements. This method was first devised by Cederschield. Both light and heavy pressure are used, and should be alternated in the same treatment. The application is made centripetally and is made to exert a pump-like action on the blood- and lymph-vessels.

By this means Schmidt has been able to quickly remove hematoma, edema, and extravasations.

In situations which admit of it, the massage is applied with the hand encircling the part. On the abdomen or thorax the massage is given with the flat or the palm of the hand. Good results are secured after gall-stone and pelvic operations.

An X-ray examination of the heart should be made in all cases before beginning treatment by massage, movements, or baths, in cases of suspected cardiac dilatation or of cardio-vascular-renal disease.

Massage in Low Vasomotor Tension.—The test for vasomotor tension is probably the best means at present known for determining the status of an individual's general nerve and muscular tonus. This test consists in the taking of the patient's pulse and blood pressure first in the supine horizontal position and then in the vertical position.

By comparison of the data thus obtained with the figures given in a table prepared by the originator of the test, Dr. Crampton, the per cent of the patient's vasomotor tonus as compared with the normal is obtained.

Low vasomotor tension, 30% or less, indicates a lack of tonus in the muscles of the abdominal wall and in the muscular structures of the mesentery arteries and veins—the so-called splanchnic circulation.

General massage, by improving the general health, especially in connection with tonic hydriatic applications raises the vascular tension; but still more marked and immediate improvement may be secured by proper application to the abdominal region.

Abdominal kneading, percussion and stroking are the movements of greatest service. Deep breathing exercises, massage on the inclined table with the head low, the weighted abdominal compress and exercises of all sorts which strengthen the abdominal muscles are all of very great service. This is especially true of exercises taken on the inclined table with the head low.

Patients with low vasomotor tension should wear the abdominal supporter constantly when on their feet. The moist abdominal bandage without the impervious covering may be worn at night to great advantage.

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